

# MONTHLY WEATHER REVIEW.

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No. 1.

BOARD OF EDITORS { Mr. Horace E. Smith, Chief Clerk of Weather Bureau,  
Professors Henry A. Hazen, Thomas Russell, and Charles F. Marvin, and  
Mr. Edward B. Garriott, in charge of Review Room.

## INTRODUCTION.

This REVIEW is based on reports for January, 1893, from 2,785 regular and voluntary observers. These reports are classified as follows: 164 reports from Weather Bureau stations; 47 reports from United States Army post surgeons; 2,010 monthly reports from state weather service and voluntary observers; 220 reports through the Central Pacific Rail-

way Company; 319 marine reports through the co-operation of the Hydrographic Office, Navy Department; 25 reports from Canadian stations; marine reports through the "New York Herald Weather Service"; monthly reports from local services established in all states and territories; and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

## CHARACTERISTICS OF THE WEATHER FOR JANUARY, 1893.

The month was characterized by exceptionally low temperature and heavy snowfall in the Middle and Southeastern States. Navigation in the rivers of the middle and northern districts was suspended on account of ice, and streams in northern parts of the Gulf and south Atlantic states were frozen. During a great part of the month ice seriously interfered with navigation in the harbors and bays of the Atlantic coast from Maine to North Carolina.

### TEMPERATURE.

In the Atlantic coast states from Massachusetts to northern Florida, in the Ohio Valley and the southern lake region, and at points in central and northern Illinois and northeastern Iowa the month was the coldest January on record. At stations in the middle and southern Rocky Mountain and plateau regions, and in southern California the month was the warmest January on record. A succession of severe cold waves visited the east Gulf and south Atlantic states. In Florida the cold waves of the 7th, 14th, and 17th caused considerable damage to fruit in the vicinity of Jupiter. On the 17th frost was reported as far south as the southern extremity of the "Everglades."

### PRECIPITATION.

Less than the usual amount of precipitation was reported, except in an area extending from the south Pacific coast to Montana and North Dakota, and over the northern lake region. From the middle and lower Mississippi rivers to the middle and southern Rocky Mountain regions, at stations in the north Pacific coast states and Tennessee, and at Albany, N. Y.,

the monthly precipitation was the least ever reported for January. At stations in the Red River of the North Valley and North Dakota the monthly precipitation was the greatest ever reported for January. In the middle and south Atlantic states, Arkansas, and north parts of the middle and west Gulf states the monthly snowfall was unusually heavy. In North Carolina and South Carolina the monthly snowfall averaged about 12.0 inches and 6.0 inches, respectively.

### STORMS.

Exceptionally severe gales prevailed over New England during the 1st and 2d. On the 5th and 6th heavy snow impeded railroad traffic in southern New England and the eastern parts of the middle Atlantic states, and destructive gales occurred along the middle Atlantic and New England coasts. From the 8th to the 10th a heavy snow and wind storm extended from the upper lake region over the middle Atlantic states. On the 12th heavy snow fell in the middle Atlantic states and along the south New England coast, and on the 13th snow fell over the interior of South Carolina. An exceptionally severe wind storm prevailed on the north Pacific coast during the 14th and 15th. A heavy snowstorm set in over Arkansas on the 17th and extended thence to the south Atlantic coast by the 18th. This snowstorm continued about two days, and was reported the severest ever experienced in the sections visited. A strong north gale, with heavy rain, thunder, and lightning, visited Key West, Fla., on the 24th. A destructive windstorm was reported at Heber, Utah, on the 30th. A severe storm of wind and snow, with very low temperature, occurred in the upper Missouri valley on the 31st.

## ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for January, 1893, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on Chart II by isobars.

The first of a series of charts showing the normal distribution of atmospheric pressure and prevailing winds over the United States and Canada for each month appears with

this issue of the REVIEW. These charts exhibit normal pressure determined from Weather Bureau records for twenty years, and prevailing wind directions based upon records for fifteen years. The series will be completed with the publication in the Annual Summary for 1893 of a chart of annual normal pressure. The publication of these charts is preliminary to the publication by the Weather Bureau of specially

prepared data and charts showing meteorological and climatic features and conditions of the United States.

The normal distribution of pressure for January shows values above 30.20 in two areas, one of which covers the interior of the south Atlantic and east Gulf states and eastern Tennessee, and the other the middle and northern plateau and Rocky Mountain regions and the middle Missouri valley. Over adjoining parts of Idaho, Nevada, and Utah, the January normal is above 30.25. The lowest pressure for January is usually shown over the Canadian Maritime Provinces, where it is below 30.00. The normal values are below 30.05 on the extreme north Pacific coast.

In January, 1893, the mean pressure was highest over the middle plateau region, where it was above 30.30, and was lowest over the Canadian Maritime Provinces, where it was below 29.85.

The mean pressure was below the normal, except from the north Pacific coast over the plateau region and southern Texas. Over the Gulf of Saint Lawrence the mean readings were .20 below the normal, and the departure below the normal was .10 to .15 over the middle Atlantic and New England states, the eastern Ohio valley, and the eastern lake region. From the Rocky Mountains over the central valleys and the Southern States, and over extreme southern California the mean pressure was .05, or more, lower than usual. The departure above the normal pressure was .10 to .15 over the interior of Washington, and in an area covering the west part of the middle plateau region.

A comparison of the pressure chart for January, 1893, with that of the preceding month shows a decrease of pressure, except over the lower Saint Lawrence and eastern Saskatchewan valleys, and from the north Pacific coast over the plateau regions and the west Gulf states. The most marked decrease of pressure occurred over the southern lake region, upper Ohio valley, and middle Rocky Mountain region, where it was more than .10. The greatest increase of pressure was shown over the middle and northern plateau regions, where the mean readings were .05 to .09 higher than for December, 1892.

#### HIGH AND LOW AREAS.

The paths of areas of high and low barometric pressure for January, 1893, are shown on Charts IV and I, respectively, and some of the more prominent features of the high and low areas are noted in the table at the end of this chapter.

#### HIGH AREAS.

Twelve high areas appeared, the average number traced for January during the last 18 years being 9. Three of the high areas advanced from the Pacific, 7 from the Saskatchewan Valley, one from the middle plateau region, and one from the region north of Lake Superior. All of the high areas from the Pacific reached the middle or south Atlantic coasts, one disappearing over Florida, the others passing northeastward towards the Gulf of Saint Lawrence. Four of the high areas from the Saskatchewan Valley advanced to the Atlantic coast, 2 disappeared north of the Lake region, and one occupied the northeast slope of the Rocky Mountains at the close of the month. One of the high areas from the middle plateau disappeared by a decrease of pressure over the southeast slope of the Rocky Mountains, and the other disappeared over the south Atlantic states.

The high areas generally moved southeastward over the central valleys, and thence eastward to the Atlantic coast. In each instance the highest pressure was shown west of the 100th meridian. The average rate of advance of the high areas, 30 statute miles per hour, was somewhat greater than the average velocity of high areas for January. The following is a description of the high areas referred to:

I.—Appeared over the Saskatchewan Valley the evening of the 1st. On that date the temperature fell 20° to 30° north of North Dakota and eastern Montana, and at the evening report was —6° at Saint Vincent, Minn. During the 2d the high area moved slowly eastward to Manitoba, the temperature fell 20° to 30° from the Missouri Valley over the upper Mississippi valley and Lake Superior, the morning temperature at Saint Paul, Minn., was —6°, and the line of freezing weather reached Cairo, Ill. During the 3d this high area disappeared north of Lake Superior, a marked fall in temperature occurred in the middle Atlantic and New England states, the morning temperature at Springfield, Ill., was zero, and freezing weather was reported in Tennessee and northern Georgia in the evening. The morning of the 4th the line of freezing weather reached the Atlantic coast south of Wilmington, N. C.

II.—Appeared north of eastern Montana the evening of the 4th, with a temperature fall of 10° to 20° over eastern Montana and Assiniboia. During the 5th the high area passed southeastward over the Missouri Valley, attended by a fall in temperature of more than 20° in the Missouri Valley, and freezing weather to Tennessee. The morning of the 6th the high area occupied the middle Mississippi valley, the line of freezing weather reached the east Gulf coast, a reading of 12° was noted at Atlanta, Ga., and at Springfield, Ill., the temperature was —2°. By the morning of the 7th the high area occupied the south Atlantic states, the temperature was below freezing over the northern half of the Florida Peninsula, and frost was reported as far south as Jupiter, Fla.

III.—Moved northward over the northern Rocky Mountain region during the 6th, with a slight fall in temperature on the northeast slope. During the 7th the high area moved southeastward over the Missouri Valley, and the temperature fell more than 20° in Nebraska. Passing southward this high area disappeared by a decrease of pressure over the southeast slope of the Rocky Mountains on the 8th. On that date a cold wave overspread the middle and west Gulf states, and the line of freezing weather reached the interior of the Gulf States. The morning of the 9th the temperature was below freezing to the east Gulf coast, and a reading of 32° was reported at Jacksonville, Fla.

IV.—Appeared north of Montana the evening of the 8th, and during the 9th moved slowly eastward to Manitoba attended by a fall in temperature of 40° over southern Minnesota. By the evening of the 10th the high area had advanced to the lower Ohio valley, the temperature had fallen 20° to 30° in the middle Atlantic and west New England states, and the line of zero temperature reached Cincinnati, Ohio. During the 11th this high area passed off the North Carolina coast, the temperature fell below zero generally in New England, and the morning minimum was below freezing over interior and north parts of the Florida Peninsula.

V.—Appeared off the north Pacific coast the evening of the 10th. On that date the temperature fell 20° to 30° over Alberta. During the 11th the high area moved over the northern Rocky Mountain region, and the temperature fell 20° to 30° in the middle Rocky Mountain region. Passing southeastward over the Missouri Valley this high area was attended on the 12th by a cold wave which overspread the lower Missouri and middle Mississippi valleys, and carried the line of zero temperature to central Iowa. During the 13th this high area reached the east Gulf states, the cold wave reached the south Atlantic coast, and the evening temperature at Savannah, Ga., was 28°. During the 14th the high area settled southeastward over the Florida Peninsula; in the morning ice one-fourth inch in thickness was reported at Titusville, Fla., and oranges in exposed places were frozen. At Jupiter, Fla., heavy frost occurred, many plants were killed, but pineapples were not injured.

VI and VIa.—Advanced from the Pacific coast over British Columbia on the 13th, with a slight fall in temperature on the northeast slope of the Rocky Mountains. The evening of the 14th a ridge of high pressure extended from the British Northwest Territory to Texas, and the line of zero temperature reached Hannibal, Mo. During the 15th an area of high pressure of great magnitude occupied the central valleys, and covered districts thence to the Rocky Mountains. At the evening report higher pressure was shown north of the Dakotas, and over Wyoming, western Montana, Oklahoma, and northern Texas. On that date the cold wave overspread the middle Mississippi and Ohio valleys and the Southern States, the temperature fell to 10° below zero at Cincinnati, Ohio, and freezing weather was reported as far south as San Antonio, Tex.

During the 16th high area VI advanced southeastward to Iowa, and high area VIa moved eastward over the Gulf States, the temperature fell 20° to 30° in the middle and south Atlantic states, to 10° below zero at Knoxville, Tenn., and to 4° below zero at Lynchburg, Va., the line of freezing weather was carried to northern Florida, and the lowest temperature on record for January was reported at Atlantic City, N. J., and Augusta, Ga., where the minimum readings were 4° below and 12° above zero, respectively. On the 17th numbers VI and VIa united, and at the evening report the pressure was high from the Saint Lawrence Valley to the east Gulf coast.

The morning of the 17th the line of freezing weather reached Tampa and Titusville, Fla.; pineapples in exposed places were damaged about Jupiter, Fla., and frost was reported to the southern extremity of the "Everglades." At points in Virginia and North Carolina the lowest temperature on record for January was noted on the 17th. During the 18th this high area passed northeastward over the Canadian Maritime Provinces.

VII and VIIa.—Moved southeastward over the northern Rocky Mountain region on the 16th and 17th, with a marked fall in temperature over Nevada, where a reading of 6° was registered at Winnemucca, Nev., the morning of the 17th. During the 18th the high area moved rapidly southeastward to Oklahoma, a cold wave overspread the upper Mississippi valley, the temperature fell to zero at Dubuque, Iowa, and the line of freezing weather reached Meridian, Miss. On the 19th this high area divided, one part passing to the lower Ohio valley and the other covering the Southwest, a severe cold wave extended over the lower Ohio valley, and the temperature fell to 4° below zero at Keokuk, Iowa. During the 20th the pressure continued high over the Southern States, a cold wave overspread the Gulf and south Atlantic states, the morning temperature at Mobile, Ala., was 22°, and a reading of 26° was reported at Charleston, S. C. During the 21st and 22d this high area moved slowly eastward, number VII passing off the middle Atlantic coast and number VIIa disappearing off the south Atlantic coast.

VIII.—Appeared north of North Dakota the evening of the 22d, with a fall in temperature of 20° over North Dakota. During the 23d this high area moved eastward north of Lake Superior, where it disappeared by a decrease of pressure. On that date the temperature fell 20° to 30° over the valley of the Red River of the North and Lake Superior, and the morning temperature was below zero in western Minnesota.

IX.—Appeared over Alberta on the 24th, with pressure above 30.70 at the evening report, and a fall in temperature of 40° over Montana. The morning of the 25th the pressure had risen above 30.80 north of Montana. On that date a severe cold wave overspread the western Dakotas and western Nebraska, and the evening report showed temperature 24° below zero at Fort Buford, N. Dak., and zero at Huron, S. Dak. During the 26th the high area moved over the Red River of

the North Valley, the temperature fell 20° to 30° from Lake Superior to Texas, the morning temperature was 30° below zero at Moorhead, Minn., and the line of zero temperature reached southern Iowa. Moving rapidly eastward this high area reached the Canadian Maritime Provinces on the 28th, its passage being attended on the 27th by a slight fall in temperature in the middle Atlantic and New England states.

X.—Appeared over Alberta the evening of the 27th, and was central over southern Alberta the morning of the 28th. On that date a general fall in temperature occurred from the middle plateau region over the Missouri Valley. During the 29th this high area advanced to the extreme upper Mississippi valley, a cold wave overspread the southern lake region, the Ohio and middle Mississippi valleys, and the Southwest, and the temperature fell to zero at Keokuk, Iowa. On the 30th the high area moved rapidly eastward to northern New England, and the night of the 30th apparently passed northward and united with high area XII. The morning reports of the 30th showed a fall in temperature of 20° over the lower lakes; over the Atlantic coast states the fall in temperature was slight.

XI.—Appeared over Alberta the evening of the 29th, with pressure above 30.80, and occupied the northeast slope of the Rocky Mountains during the 30th and 31st. On the 30th the weather was very cold over Montana and the Dakotas, and over North Dakota and Montana the temperature fell to 30° below zero. On the 31st the temperature fell 20° to 40° over South Dakota and Nebraska, and was 30° to 45° below zero in North Dakota and Montana. At Helena, Mont., the morning temperature of the 31st, 42° below zero, was the lowest ever noted at that station in January. In eastern Washington the temperature was 5° to 17° below zero on the 31st.

XII.—Advanced from the region north of Lake Superior to the lower Saint Lawrence valley during the last two days of the month. Following closely high area X, number XII produced slight temperature changes over the Northeastern States.

#### LOW AREAS.

The average velocity of low areas for January and February, 37 statute miles per hour, is the highest noted for the year. The principal track of low areas for January is traced from the northeast slope of the Rocky Mountains over the upper lake region, the Saint Lawrence Valley, and Newfoundland. Less frequented tracks are traced from the middle plateau region and the west Gulf states to the Saint Lawrence Valley. About 2 low areas per month advance northeastward along the Atlantic coast in January. Four to five low areas traverse the Saint Lawrence Valley in January, making that the region of greatest storm frequency in North America. The average number of low areas which traverse the North American continent from the Pacific to the Atlantic coasts in January is about 2.

The tracks of 16 areas of low pressure are plotted on Chart I for January, 1893, the average number traced for January during the last 20 years being 13. Ten of the low areas first appeared over Alberta, one advanced from the north Pacific, one from the middle Pacific, and one from the south Pacific coasts, one moved southeastward from Wyoming, one originated north of Lake Superior, and one was a continuation of low area X for December, 1892. Six of the low areas from Alberta, and 2 of the low areas from the Pacific reached the Atlantic coast. The low area from the north Pacific coast occupied Lake Superior at the close of the month. The movement of the low areas was very erratic, and the average velocity varied from 16 to 54 miles per hour. Three of the low areas were attended by subsidiary developments, and 6 dissipated between the 80th and 100th meridians.

A notable characteristic of the low areas was the marked loss of strength shown while traversing the central valleys, and the decided increase in energy observed after they had

passed off the Atlantic coast. The unusually low temperature which prevailed over the central and eastern districts doubtless contributed to the loss of energy of the low areas in crossing those districts. The following is a description of the low areas traced:

I.—Was a continuation of low area X for December, 1892, and at the opening of the month was central over Kentucky, with pressure below 29.40. By the evening of the 1st the storm center had advanced to western Lake Ontario, the barometer had fallen below 29.10, a marked rise in temperature had occurred in the middle Atlantic and New England states, rain or snow was reported generally east of the Mississippi River, severe southeast gales set in over southern New England, and high south to southwest winds prevailed along the middle and south Atlantic coasts.

During the 2d the center passed to the northern part of the Gulf of Saint Lawrence, with pressure below 28.90, the temperature rose 20° to 30° in New England, the rain and snow area contracted over the Lake region, northern New York, and northern New England, and southerly winds of 50 to 60 miles per hour were noted on the Massachusetts coast in the morning.

II.—Occupied Alberta at the opening of the month, and at the evening report of the 1st was central over eastern Montana with pressure below 29.80, and snow over the greater part of the Dakotas and northeastern Montana. During the 2d this low area moved southeastward and disappeared by an increase of pressure over the middle Mississippi valley, attended by small areas of snow in the Missouri and middle Mississippi valleys.

III, IIIa, and IIIb.—Low area III was central over Alberta the morning of the 3d, with pressure below 29.40, and by the evening report had advanced to the region north of North Dakota. On that date the temperature rose 20° to 30° over the Dakotas, snow fell from North Dakota to the lower Ohio valley, and high southwest to northwest winds prevailed on the eastern slope of the Rocky Mountains. During the 4th this low area passed eastward to Lake Superior, a subsidiary development moved eastward over the Ohio Valley, and at the evening report a third disturbance appeared off the North Carolina coast. On that date snow fell generally from the middle and upper Mississippi and Red River of the North valleys to the middle Atlantic coast.

On the 5th low areas III and IIIa passed southeastward and united with the disturbance which moved northeastward from the North Carolina coast, and at 8 p. m. the pressure was below 29.40 off the middle Atlantic coast. On that date snow fell from the middle and upper Mississippi valleys to the middle Atlantic and south New England coasts, severe northeast gales prevailed along the middle Atlantic and New England coasts, and high northwest winds were reported over Lake Michigan.

During the 6th the storm center advanced to the vicinity of Cape Breton Island, where the barometer fell to 28.82, northeast shifting to northwest gales prevailed along the New Jersey and New England coasts, and heavy snow impeded railroad traffic in southern New England, eastern New York, eastern Pennsylvania, and New Jersey. High northwest winds continued along the New England coast until the morning of the 7th.

IV.—Appeared over Alberta on the 5th, with pressure below 29.80. During the 6th the center moved southeastward to the middle Missouri valley, the temperature rose 20° in the Missouri Valley, snow fell in the middle and upper Missouri and upper Mississippi valleys, and high northwest winds prevailed over the Dakotas and Nebraska. Passing southeastward this low area disappeared by an increase of pressure over the east Gulf states the night of the 7th. On that date the snow area overspread the Lake region, the Ohio and mid-

dle Mississippi valleys, and the interior of the middle Atlantic states.

V.—Appeared over northern Alberta on the 7th, passed thence to Lake Superior by the evening of the 8th, and reached eastern Ontario by the night of the 9th. On the 8th the temperature rose 20° to 30° in the Missouri Valley, and snow fell in the Lake region, the upper Ohio valley, and the interior of the middle Atlantic states. On the 9th the temperature rose 20° to 30° in eastern Ontario, the snow area extended to the middle Atlantic and New England coasts, and heavy, drifted snow interrupted traffic in Upper Michigan and northern Lower Michigan.

The morning of the 10th the low area was central off the Maine coast, with pressure about 29.00, and by the evening report of that date had advanced to the lower Saint Lawrence valley, where the barometer fell to 28.88 at Father Point, Quebec. On that date the temperature rose 30° in the Canadian Maritime Provinces, high northwest winds prevailed along the middle and north Atlantic coasts, and drifted snow interfered with railroad traffic in Pennsylvania. By the morning of the 11th the storm center had disappeared north of the Gulf of Saint Lawrence.

VI and VIa.—Appeared north of western Montana on the 9th. The morning of the 10th this low area divided, one part passing to South Dakota and the other to the region north of North Dakota. On that date snow fell in the middle and upper Missouri valleys, and high westerly winds prevailed in the middle Rocky Mountain region. During the 11th a trough of low pressure moved eastward over the central valleys and the Lake region, snow fell generally north of the Ohio and Missouri rivers, heavy snow was general in northern Illinois, and high northwesterly winds prevailed in the Missouri Valley. By the night of the 12th low areas VI and VIa had united off the south New England coast. On that date heavy snow fell in the middle Atlantic states and on the south New England coast.

VII.—Appeared over northern Alberta the evening of the 12th, and during the 13th moved rapidly southeastward to the middle-eastern slope of the Rocky Mountains, with pressure below 29.80, snow in the middle and upper Missouri valleys, and high westerly winds in the middle Rocky Mountain region. The evening of the 14th this low area presented a trough of low pressure extending from the lower lakes to the middle Gulf coast, the snow area had extended to the middle Atlantic coast, and heavy snow had interrupted traffic and telegraphic communication in the middle and upper Ohio valleys. During the 15th this low area passed eastward off the middle Atlantic coast and thence northeastward towards Nova Scotia.

VIII.—Occupied the upper Saskatchewan valley the morning of the 16th, and by the evening report had advanced to Manitoba, with pressure below 29.80. During the 17th the storm-center advanced to Lake Superior, and snow fell from the Dakotas over the upper lake region. Moving slowly over the upper lakes during the 18th this low area apparently dissipated over New England the early part of the 19th. Its passage over the Great Lakes was unattended by noteworthy features.

IX.—Appeared over the lower Colorado valley the evening of the 16th, with rain in southern California and southern Arizona, and snow in Colorado and northern New Mexico. During the 17th the center of disturbance moved rapidly eastward to the lower Rio Grande valley, snow or rain fell generally in the Southwest, and exceptionally heavy snow set in over Arkansas in the evening. On the 18th the storm-center advanced to the middle Gulf coast, the rain and snow area extended from the Gulf and south Atlantic coasts over the Lake region, and heavy rain, changing at night to heavy snow, fell over the Gulf States. By the morning of the 19th

this low area had passed off the south Atlantic coast, the area of heavy rain and heavy snow had extended over the south Atlantic states, and northerly gales prevailed on the Carolina coast.

X.—Was an area of low pressure of slight intensity which moved eastward over the upper Saskatchewan valley during the 18th and 19th. This low area was attended by light snow from Manitoba to northwestern Wisconsin on the 19th.

XI.—Appeared over northern Alberta the evening of the 19th, with pressure below 29.80, and passed thence to Manitoba by the night of the 20th, with a rise in temperature of  $20^{\circ}$  to  $30^{\circ}$  in Iowa, and light snow in the upper Mississippi valley and the western lake region. The night of the 20th this low area disappeared north of Lake Superior. During the 21st the snow area extended eastward over the Lake region and the middle Ohio valley.

XII.—Was probably a continuation of low area XI, and moved slowly eastward over the northern lake region during the 22d and 23d, attended by light snow, which extended over the middle Atlantic and New England states during the 23d. During the 24th this low area dissipated north of Lake Ontario.

XIII.—Moved southeastward from Alberta and the evening of the 23d occupied North Dakota, with pressure below 29.80. On that date light snow fell over the eastern Dakotas and in the valley of the Red River of the North. During the 24th the low area moved to southwestern Lower Michigan, and the snow area extended over the Lake region, the Ohio Valley, and parts of New York and Pennsylvania. During the 25th the center of disturbance moved rapidly eastward and at the evening report was central near Eastport, Me. On that date the snow area contracted over northern New England and northern New York. By the morning of the 26th the storm center had passed east of Nova Scotia.

XIV.—Was a short-lived low area of slight intensity which

moved southeastward over the Rocky Mountain region from Montana to northwest Texas during the 24th and 25th. On the 24th snow fell on the northeast slope of the Rocky Mountains, and in parts of the Dakotas. On the 25th the snow area covered the middle and upper Missouri and extreme upper Mississippi valleys.

XV.—The presence of a disturbance off the middle Pacific coast was shown by reports of the 25th, and the morning of the 26th this low area was apparently central near Eureka, Cal., where the pressure was 29.48. During the day the pressure decreased to 29.24 at Eureka, heavy rain fell in central and northern California, snow was reported over the northern Rocky Mountain and plateau regions, and hard easterly gales prevailed on the north Pacific coast. During the 27th this low area apparently divided, one part, low area XV, passing to the middle Rocky Mountain region and the other to the north Pacific coast. On that date heavy rain fell in California, snow was reported generally over the north part of the middle plateau, and from the north Pacific coast over the northern Rocky Mountain region, and high south to west winds prevailed over the middle plateau and middle and southern Rocky Mountain regions.

During the 28th the storm-center advanced to Illinois, with pressure below 29.70. East of the Mississippi River rain fell in areas. Between the Mississippi River and the Rocky Mountains snow was followed by clearing, colder weather, and high westerly winds prevailed over the Western States. Moving rapidly northeastward the center reached the region north of the lower Saint Lawrence river the night of the 29th. On that date westerly gales prevailed over the Great Lakes, heavy rain fell in the middle Atlantic and New England states, and snow drifted heavily in eastern Upper Michigan.

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XVI.—As noted in the description of low area XV the area of low pressure which appeared on the middle Pacific coast on the 25th divided on the 27th, one part, number XVI, pass-

*Tabulated statement showing principal characteristics of areas of high and low pressure.*

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum pressure change in 12 hours, maximum abnormal temperature change in 12 hours, and maximum wind velocity.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.	Days.	Miles.		Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.		
High areas.																				
I.	8	0	0	0	0	1-5	22	Concordia, Kans.	.40	Moorhead, Minn.	.00	Springfield, Ill.	n.w.	35						
II.	4	51	106	34	83	2-0	39	Swift Current, N. W. T.	.56	Bismarck, N. Dak.	.28	Kansas City, Mo.	n.w.	36						
III.	5	42	113	31	101	2-5	43	Qu'Appelle, N. W. T.	.70	Springfield, Mo.	.24	Rapid City, S. Dak.	n.w.	43						
IV.	8	54	110	38	82	2-5	34	Duluth, Minn.	.46	Kingston, Ont.	.34	Hatteras, N. C.	n.w.	36						
V.	10	45	125	28	82	4-0	33	Swift Current, N. W. T.	.56	Bismarck, N. Dak.	.30	Kearney, Nebr.	n.	46						
VI.	13	51	121	48	65	5-0	30	Rapid City, S. Dak.	.56	Calgary, N. W. T.	.28	Block Island, R. I.	ne.	36						
VIa.	15	41	105	32	83	1-5	42	Springfield, Mo.	.58	San Antonio, Tex.	.22	Titusville, Fla.	n.	30						
VII.	16	50	120	39	72	6-0	24	El Paso, Tex.	.32	Bismarck, N. Dak.	.26	Pueblo, Colo.	n.	32						
VIII.	19	35	97	30	75	3-5	19	Hatteras, N. C.	.24	Abilene, Tex.	.14	Titusville, Fla.	n.	18						
VIII.	22	52	100	50	87	1-0	22	Prince Albert, N. W. T.	.32	Minnedosa, Man.	.25	Winnipeg, Man.	ne.	18						
IX.	25	53	113	43	62	4-0	26	Rockcliffe, Ont.	.56	Helena, Mont.	.39	Fort Buford, N. Dak.	n.w.	28						
X.	28	52	113	43	73	3-5	27	Alpena, Mich.	.64	do.	.35	Buffalo, N. Y.	sw.	36						
XI.	30	53	114	48	110	1-0	17	Pierre, S. Dak.	.80	Huron, S. Dak.	.43	Fort Buford, N. Dak.	n.w.	42						
XII.	30	51	87	47	72	1-0	30	Port Arthur, Ont.	.32	Milwaukee, Wis.	.14	Father Point, Que.	n.	24						
Mean.						2-7	30		.50			28						32		
Low areas.																				
I.	1	38	84	47	71	1-0	40	Kingston, Ont.	.76	Chatham, N. B.	.28	Woods Hole, Mass.	se.	60						
II.	1	53	113	39	97	1-0	54	Miles City, Mont.	.30	Moorhead, Minn.	.18	Cheyenne, Wyo.	w.	38						
III.	3	53	115	45	60	3-5	48	Edmonton, N. W. T.	.60	Valentine, Nebr.	.23	Havre, Mont.	sw.	52						
IIIa.	4	39	90	36	75	1-0	38	Kansas City, Mo.	.44	Cairo, Ill.	.21	Block Island, R. I.	ne.	70						
IV.	5	52	114	34	87	2-0	40	Bismarck, N. Dak.	.54	Rapid City, S. Dak.	.24	Kearney, Nebr.	n.w.	54						
V.	7	54	113	50	65	3-5	33	Saint Vincent, Minn.	.78	Saint Paul, Minn.	.36	Woods Hole, Mass.	n.w.	51						
VI.	9	51	114	40	67	3-0	35	Prince Albert, N. W. T.	.50	Rockcliffe, Ont.	.27	Bismarck, N. Dak.	n.	52						
VIa.	10	48	110	40	67	2-5	50	Hatteras, N. C.	.50	Wilmington, N. C.	.24	Kearney, Nebr.	n.w.	54						
VII.	12	53	112	42	65	3-0	50	Halifax, N. S.	.44	Atlanta, Ga.	.26	Colorado Springs, Colo.	n.w.	51						
VIII.	15	54	108	45	80	3-0	21	Minnedosa, Man.	.62	Keokuk, Iowa.	.30	Saint Vincent, Minn.	s.	36						
IX.	16	34	115	33	75	2-5	45	Hatteras, N. C.	.54	New Orleans, La.	.13	Kittyhawk, N. C.	ne.	53						
X.	17	55	114	53	100	1-5	10	Medicine Hat, N. W. T.	.20	Moorhead, Minn.	.24	Bismarck, N. Dak.	n.w.	28						
XI.	19	53	115	51	100	1-0	27	Calgary, N. W. T.	.32	Medicine Hat, N. W. T.	.15	Havre, Mont.	sw.	28						
XII.	22	48	87	47	80	1-0	14	White River, Ont.	.20	Knoxville, Tenn.	.22	Marquette, Mich.	n.w.	16						
XIII.	23	51	112	45	66	2-5	42	Sydney, C. B. I.	.56	Indianapolis, Ind.	.26	Cleveland, Ohio.	n.w.	40						
XIV.	24	44	108	36	102	1-0	25	Salt Lake City, Utah.	.24	Fort Smith, Ark.	.16	Amarillo, Tex.	sw.	36						
XV.	26	41	125	48	70	3-5	42	Sydney, C. B. I.	.58	Kington, Ont.	.30	Tatoosh Island, Wash.	se.	72						
XVI.	29	48	125	48	90	2-0	42	Moorhead, Minn.	.76	Moorhead, Minn.	.38	Huron, S. Dak.	w.	60						
Mean.						2-1	36		.50			24						47		

\*80 miles nw., Pikes Peak, Colo., 1st.

198 miles w., Pikes Peak, Colo., 10th.

196 miles w., Pikes Peak, Colo., 13th.

496 miles w., Pikes Peak, Colo., 27th.

ing over the middle plateau. The other part apparently moved northward and occupied the north Pacific coast until the morning of the 30th, attended by snow and gales in Washington and Oregon. The evening report of the 30th showed a trough of low pressure extending from the north Pacific coast to the middle Rocky Mountain region. On that date a disturbance appeared on the middle California coast, heavy rain prevailed in California, heavy snow fell in areas from the north Pacific coast over the middle plateau, destructive windstorms were reported in Utah, and west to northwest gales occurred on the Washington coast.

By the morning of the 31st this low area had been divided by an area of high barometer (number XI) which extended rapidly southeastward over the eastern Rocky Mountain slope. One part, XVI, occupied eastern Nebraska and the other, XVIa, was central over Colorado. By the evening report of the 31st XVI had advanced to Lake Superior, and XVIa remained over Colorado. On that date rain fell in the Ohio and middle Mississippi valleys and the southern lake region, a heavy snowstorm prevailed in Minnesota and parts of Iowa, and snow was followed by clearing weather, high westerly winds, and intense cold in the Northwest.

#### NORTH ATLANTIC STORMS FOR JANUARY, 1893.

[*Pressure in inches and millimeters; wind-force by Beaufort scale.*]

The paths of storms that appeared over the west part of the north Atlantic Ocean during January, 1893, are shown on Chart I. These paths have been determined from reports of observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

The normal distribution of pressure over the north Atlantic Ocean for January shows highest pressure in a small area situated about midway between the Azores and the Windward Islands, where the values are above 30.20 (767). A belt of high pressure, with readings above 30.10 (764), stretches from the eastern part of the ocean between the 20th and 40th parallels to the coast of the United States south of the 41st parallel. The normal pressure is lowest in an elongated area extending from southern Greenland over Spitzbergen; where it is below 29.50 (749).

In January there is usually an increase of pressure over the southern part of the north Atlantic Ocean, the greatest increase, about .05 inch, appearing in an area southwest of the Azores. Over the northern part of the ocean there is a decrease of pressure. The storms of January generally advance from the Canadian Maritime Provinces towards the Iceland area of low pressure. The storms of this month have an average velocity of about 22 statute miles per hour, and an average of about 2.5 storms per month traverse the ocean from the American to the European coasts.

Generally fine weather prevailed in the vicinity of the British Isles during January, 1893. In the first decade a storm apparently moved eastward over the Bay of Biscay, and from the 24th to the close of the month the pressure continued low west of Ireland. Over mid-ocean and thence to the American coast the month was marked by storms of exceptional severity. Three storms were traced from America to European waters.

Two storms of marked strength occupied the north Atlantic at the opening of the month. One of the storms was central southwest of Ireland, with pressure below 29.30 (744), the other was located southwest of the Azores, where the barometer fell to about 29.40 (747). The afternoon and evening of the 1st westerly gales prevailed along the middle and south Atlantic coasts, attending the passage of low area I over the lower lake region. During the 2d the pressure continued low west of the British Isles, and a severe storm moved northeastward over the Azores. Low area I passed northeastward over the lower Saint Lawrence valley and the north part of the Gulf of Saint Lawrence, and hard westerly gales continued along the Atlantic coast.

Reports of the 3d indicate that the storm central west of the British Isles on the 1st and 2d united with the storm which advanced from the Azores. On that date hard gales and pressure below 29.30 (744) were reported between the

20th and 30th meridians and south of the 50th parallel, and the pressure continued low over the Gulf of Saint Lawrence. During the 4th the pressure continued low over mid-ocean and the Gulf of Saint Lawrence.

On the 5th low area III advanced off the middle Atlantic coast, with pressure about 29.40 (747), and the pressure continued low between the 20th and 30th meridians. During the 6th low area III moved northeastward to a point south of Cape Breton Island, with pressure below 29.00 (736), and west to northwest gales of force 10 to 11 were encountered between the 55th and 65th meridians. The pressure continued low southwest of the British Isles. The morning of the 7th low area III was central south of Newfoundland, with pressure about 29.15 (740), and the storm over the eastern part of the ocean had increased in energy and shifted position to a point southwest of Ireland.

During the 8th low area III advanced to mid-ocean, and the pressure was about 29.30 (744) south of Ireland. By the 9th low area III had advanced to a position north of the Azores, with central pressure below 29.40 (747), the storm which had occupied the ocean southwest and south of the British Isles from the 6th to the 8th had moved eastward over the Bay of Biscay, and a storm area covered Newfoundland and the Grand Banks. By the morning of the 10th low area III had apparently moved eastward over the Bay of Biscay, a storm from the Grand Banks had moved northeastward north of the 50th parallel, low area V had advanced off the New England coast, with pressure below 29.10 (739), and westerly gales of force 9 to 11 were reported west of the 60th meridian. During the 10th low area V recurred northward to the lower Saint Lawrence valley and passed thence northeast of Newfoundland by the 12th, attended by strong gales over and near the Grand Banks.

During the 12th low area VI passed south of east off the New England coast, with pressure about 29.30 (744) and northwest to west gales of force 10. Moving northeastward, with gales of force 9 to 11, low area VI reached a position east of Cape Breton Island the morning of the 13th, and disappeared north of Newfoundland during the 14th. On the 15th low area VII moved northeastward off the New England and Nova Scotia coasts, and a storm appeared south of the Azores. During the 16th low area VII disappeared north of Newfoundland, and the storm south of the Azores increased in energy. During the 17th and 18th the storm near the Azores shifted position to the west and northwest, and by the 19th had apparently reached Newfoundland, attended by northwest gales of force 7 to 10 west of the 60th meridian.

The morning of the 19th low area IX passed off the south Atlantic coast, attended by severe gales south of Hatteras. During the 20th low area IX moved northeastward to the Grand Banks, with northwest gales of force 9 to 10 off the Atlantic coast, and passed northeast of Newfoundland by the

morning of the 21st. This storm occupied mid-ocean in high latitudes during the 22d and 23d, and passed north of the British Isles during the 24th.

The night of the 25th low area XIII moved eastward over Nova Scotia and the morning of the 26th was central south of Newfoundland. Passing thence northeast to a position north of the Grand Banks by the morning of the 27th, attended by northwest gales of force 10 to 11, this storm moved thence rapidly eastward and united with a storm which appeared over mid-ocean on the 26th. On the 29th the pressure fell below 29.00 (736) over mid-ocean; by the 30th the storm had advanced to about the 20th meridian, and during the 31st apparently passed north of the British Isles.

#### OCEAN ICE.

The first Arctic ice reported since October, 1892, and the first ice reported south of the 50th parallel since August, 1892, was a large berg noted in N.  $47^{\circ} 35'$ , W.  $48^{\circ} 34'$  on the 5th. On the 8th a long, low berg was observed in N.  $48^{\circ} 10'$ , W.  $47^{\circ} 26'$ . On the 18th a berg was noted in N.  $48^{\circ}$ , W.  $46^{\circ}$ . In January, 1892 and 1889, no ice was reported. In January, 1891, three large icebergs were observed in N.  $46^{\circ} 30'$ , W.  $52^{\circ} 46'$  on the 28th, and on the 31st patches of soft ice were encountered in N.  $45^{\circ} 50'$ , W.  $59^{\circ} 20'$ . In 1890 vast

fields of ice and enormous icebergs were encountered over and near the Grand Banks north of the 43d parallel. In January, 1882 to 1888, inclusive, Arctic ice in small quantities was reported east of Newfoundland, but in no case was it sighted south of the 43d parallel.

The positions of icebergs reported for the current month are shown on Chart I by ruled shading. Ice encountered along the Atlantic coast and in the rivers, bays, and harbors of the United States is noted under "Inland Navigation."

#### OCEAN FOG.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on eight dates; between the 55th and 65th meridians on one date; and west of the 65th meridian on six dates. Compared with the corresponding month of the last five years the dates of occurrence of fog east of the 55th meridian numbered 1 more than the average; between the 55th and 65th meridians 8 less than the average; and west of the 65th meridian the same as the average. The dense fog noted by shipmasters and reported at stations of the Weather Bureau on the middle Atlantic and New England coasts generally attended the advance or passage of general storms.

### TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for January, 1893, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over extreme southern Florida, and at stations in the Colorado Desert, California, where it was above 60. The mean temperature was above 50 in Florida south of the 30th parallel, along the Gulf coast west of the Mississippi River, in eastern Texas south of the 31st parallel, and generally in California south of the 35th parallel. North of a line traced from the South Carolina coast westward to northwest Texas and southern New Mexico, thence northwestward over southern Nevada, and thence along the Sierra Nevada and Coast Ranges of mountains to northwest Oregon the mean values were above 40.

The mean temperature was lowest in Manitoba, where it was  $-5$  to  $-10$ . The mean readings were below zero in northern Ontario, the northern half of Minnesota, and eastern North Dakota, and were below 10 in northern New England, northern New York, over the northern lake region, along the Mississippi River from Davenport, Iowa, northward, and north of a line traced from near Davenport to northeastern Montana. North of a line traced from the south New England coast to southern Illinois and central Missouri, and thence to extreme northwest Montana, and in areas in the middle and northern Rocky Mountain and plateau regions the mean temperature was below 20.

#### YEARS OF HIGHEST MEAN TEMPERATURE FOR JANUARY.

At Fort Reno, Okla., Fort Supply, Ind. T., Eureka Ranch, Kans., Deming and Santa Fe, N. Mex., Las Animas and

Denver, Colo., Cheyenne and Fort Washakie, Wyo., Fort Robinson, Nebr., Fort Mohave and Whipple Barracks, Ariz., San Diego, Los Angeles, Riverside, and Keeler, Cal., and Fort Townsend, Wash., the mean temperature for the current month was the highest noted during the respective periods of observation.

In the 22 years preceding 1893 the highest mean temperature for January occurred from the north Pacific coast to western Minnesota in 1891; along the Atlantic and east Gulf coasts and on the southeast slope of the Rocky Mountains in 1890; over the middle and northern plateau regions in 1887; and from the Alleghany Mountains over the Ohio and Mississippi valleys, the Lake region, the middle-eastern slope of the Rocky Mountains, and the west Gulf coast in 1880.

#### YEARS OF LOWEST MEAN TEMPERATURE FOR JANUARY.

At Woods Hole and Nantucket, Mass., Block Island, R. I., New London and New Haven, Conn., New York, Plattsburg Barracks, Rochester, and Buffalo, N. Y., Atlantic City, N. J., Philadelphia, Pittsburg, Erie, Dyberry, Grampian, and Wellsboro, Pa., Baltimore and Cumberland, Md., Washington, D. C., Norfolk and Lynchburg, Va., Raleigh, Charlotte, Hatteras, Kittyhawk, Wilmington, Southport, and Lenoir, N. C., Statesburg, S. C., Augusta and Savannah, Ga., Jacksonville, Fla., Louisville, Ky., Parkersburg, W. Va., Cincinnati, Columbus, Cleveland, and Toledo, Ohio, Indianapolis and Lafayette, Ind., Springfield and Chicago, Ill., and Davenport and Dubuque, Iowa, the mean temperature for the current month was the lowest noted for January during the respective periods of observation.

In the 22 years preceding 1893 the lowest mean temperature for January was noted from the California coast over Nevada and eastern Oregon in 1890; on the New England coast and in an elongated area extending from the north Pacific coast to Lake Michigan in 1888; from the southeast slope of the Rocky Mountains and eastern Kansas to the south Atlantic coast in 1886; and on the middle-eastern slope of the Rocky Mountains in 1875.

#### DEPARTURE FROM NORMAL TEMPERATURE.

The mean temperature was below the normal east of a line traced from the Red River of the North to the lower Missis-

sippi valleys. The month was also colder than usual along the Pacific coast north of the 35th parallel, and thence over northern Nevada, northwestern Utah, southern Idaho, Oregon, and southern and western Washington. From the south Pacific coast to the lower Mississippi valley and thence to the British Possessions from Manitoba to Vancouver Island the mean temperature was above the normal.

The most marked departure below the normal temperature was shown in an area which extended from the Maryland, Virginia, and North Carolina coasts over southern Ohio, northern Indiana, and northern Illinois, where the mean temperature was 10 or more below the normal. Generally over the country east of the Mississippi River, and over Oregon, northern Nevada, and northeastern California, the mean readings were more than 4 lower than usual.

The greatest departure above the normal temperature was noted in southern Alberta, and in an area covering eastern Colorado, western Kansas, and southwestern Nebraska, where the mean readings were 10 to 12 above the January average. On the eastern slope of the Rocky Mountains from Alberta to central Texas the mean temperature was more than 6 above the normal.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for January for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for January, 1893; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for January during the period of observation and the years of occurrence:

State and station.	(5) Extreme monthly mean for January.							
	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1893.	(4) Departure from normal.	Highest.	Year.	Lowest.	Year.
Arizona.	°	Years	°	°	°			
Fort Apache	34.7	21	39.7	+ 5.0	39.8	1882	27.4	1874
Fort Mohave	51.3	20	56.4	+ 5.1	56.4	1879, '93	44.0	1890
Whipple Barracks	35.1	21	40.7	+ 5.6	40.7	1871, '93	27.5	1888
Arkansas.								
Keesees Ferry	33.3	11	33.6	+ 0.3	45.6	1890	24.2	1886
California.								
Fort Bidwell	30.0	21	27.4	- 2.6	37.8	1881	18.9	1890
Riverside	50.4	11	54.0	+ 4.2	54.6	1893	43.0	1890
Colorado.								
Las Animas	23.2	11	34.6	+ 11.4	34.6	1893	16.4	1885
Florida.								
Merritts Island	62.4	11	58.8	- 3.6	69.8	1882	55.4	1886
Georgia.								
Forsyth	48.0	19	44.5	- 3.5	59.4	1880	40.8	1884
Idaho.								
Boise Barracks	28.4	19	26.4	- 2.0	39.2	1874	17.7	1888
Fort Sherman	25.4	9	23.2	- 2.2	34.4	1891	18.8	1890
Indiana.								
Lafayette	24.3	13	13.5	- 10.8	41.3	1880	13.5	1893
Indian Territory.								
Fort Supply	29.2	14	37.2	+ 8.0	37.2	1893	19.7	1875
Iowa.								
Cresco	9.8	21	3.5	- 7.3	26.1	1880	- 1.3	1883
Kansas.								
Eureka Ranch	23.2	10	31.0	+ 7.8	31.0	1893	14.7	1886
Independence	29.1	21	26.6	- 0.5	45.8	1880	18.6	1886
Salina	24.6	10	26.6	+ 4.0	31.5	1891	20.6	1883
Louisiana.								
Grand Coteau	51.8	10	49.7	- 2.1	64.0	1890	47.2	1892
Maine.								
Orono	15.7	19	.....	.....	24.7	1889	8.2	1875
Maryland.								
Cumberland	30.0	23	22.8	- 7.2	40.7	1890	22.8	1893
Michigan.								
Kalamazoo	22.1	17	15.5	- 6.6	36.0	1880	14.0	1881
Missouri.								
Sedalia	24.9	10	21.8	- 3.1	35.6	1889	13.6	1887
Montana.								
Fort Custer	11.5	13	26.2	+ 14.7	28.6	1891	3.2	1886
Nebraska.								
Fort Robinson	20.9	8	29.4	+ 8.5	29.4	1893	15.7	1890
Genoa (near)	16.2	17	19.4	+ 3.2	29.2	1880	5.0	1886
Nevada.								
Browns	31.3	22	31.4	+ 0.1	39.6	1873	19.0	1888
Carson City	30.2	16	32.8	+ 2.6	37.0	1881	18.9	1890
New Hampshire.								
Hanover	17.6	22	10.3	- 7.3	25.4	1889	6.8	1888
New Mexico.								
Deming	42.0	10	50.4	+ 8.4	50.4	1893	36.8	1883
Fort Wingate	39.8	22	35.6	+ 5.8	36.8	1877	23.8	1878

#### Departures from normal temperature—Continued.

State and station.	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1893.	(4) Departure from normal.	(5) Extreme monthly mean for January.			
	°	Years	°	°	Highest.	Year.	Lowest.	Year.
New York.	°		°	°	°		°	
Cooperstown	20.4	22	14.1	- 6.3	31.6	1880	12.3	1875
Plattsburg Barracks	16.8	22	8.8	- 8.0	27.4	1880	8.8	1893
North Carolina.								
Lenoir	36.3	21	27.3	- 9.0	46.5	1890	27.3	1893
Oklahoma.								
Fort Reno	31.8	10	40.2	+ 8.4	40.2	1893	33.0	1886
Fort Sill	35.9	21	39.0	+ 3.1	45.1	1880	25.7	1875
Oregon.								
Bandon	43.6	9	.....	.....	48.8	1891	39.6	1888
Pennsylvania.								
Dyberry	21.7	22	14.1	- 7.6	31.6	1890	14.1	1893
Grampian	23.2	22	15.0	- 8.2	35.0	1880	15.0	1893
Wellsboro	25.4	13	15.8	- 9.6	35.8	1890	15.8	1893
South Carolina.								
Statesburg	45.3	11	38.0	- 7.3	54.6	1890	38.0	1893
South Dakota.								
Fort Sully	32.2	22	14.9	+ 2.7	30.3	1891	0.1	1875
Texas.								
Austin	47.8	21	47.8	0.0	59.5	1880	40.0	1892
Silver Falls	49.7	7	43.2	+ 2.5	46.6	1890	36.2	1892
Utah.								
Terrace	22.6	21	21.7	- 0.9	31.4	1872	9.8	1888
Vermont.								
Stratford	16.4	19	9.4	- 7.0	25.4	1889	6.9	1888
Virginia.								
Dale Enterprise	32.8	13	22.2	- 10.0	48.1	1890	20.7	1881
Washington.								
Fort Townsend	38.0	18	35.7	- 2.3	35.7	1893	30.3	1875
West Virginia.								
Parkersburg	31.9	12	21.9	- 10.0	42.4	1890	21.9	1893
Wisconsin.								
Embarra	12.8	22	.....	.....	27.3	1880	0.2	1875
Madison	16.3	22	7.2	- 9.1	33.6	1880	4.1	1875
Wyoming.								
Fort Washakie	14.5	10	29.6	+14.1	39.6	1893	6.6	1888

#### MAXIMUM TEMPERATURE.

At San Diego and Los Angeles, Cal., Helena, Mont., Spokane and Fort Canby, Wash., the maximum temperature for the current month was the highest ever reported for January.

The highest temperature reported by a regular station of the Weather Bureau for January, 1893, was 84, at Los Angeles, Cal., on the 3d. The temperature reached 80 at San Diego, Cal., on the 2d, and 81 at Corpus Christi, Tex., on the 11th. The maximum readings were above 70 south of a line traced from the Atlantic coast between Savannah, Ga., and Charleston, S. C., to west-central Kansas, thence to southeastern New Mexico, thence to southern Nevada, and thence to the California coast in latitude about N. 35°. Along the Mississippi River from Davenport, Iowa, northward, and in Upper Michigan, northern Lower Michigan, Wisconsin, Minnesota, and eastern and northern North Dakota the maximum temperature was below 40.

#### MINIMUM TEMPERATURE.

At Atlantic City, N. J., Lynchburg, Norfolk, and Cape Henry, Va., Raleigh and Kittyhawk, N. C., Augusta, Ga., and Helena, Mont., the minimum temperature for the current month was the lowest reported for January during the respective periods of observation.

The lowest temperature reported by a regular station of the Weather Bureau for January, 1893, was -43, at Havre, Mont., on the 31st. The minimum temperature was -42 at Helena, Mont., and fell below -30 generally over Montana, North Dakota, and northwestern Minnesota. The line of zero temperature is traced from southern Maryland to extreme northern Georgia, thence to Cairo, Ill., thence to Oklahoma, thence to northeastern Kansas, thence to west-central Kansas, thence to Cheyenne, Wyo., thence to south-central Colorado, thence to northern Utah, central Nevada, and northeastern California, and thence irregularly northward to northwestern Washington. The highest minimum temperature, 52, was noted at Key West, Fla., and the minimum

values were above 30 over the southern half of the Florida Peninsula, along the Gulf coast west of the Mississippi River, and in western and southern California.

#### LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather in January, 1893, is shown on Chart V by a line traced across the Florida Peninsula south of Titusville and Tampa, and inside the Louisiana and Texas coast line. The western limit of freezing weather is shown by a line traced from southwestern Arizona over the central valleys of California to a point on the coast north of Eureka, Cal.

#### RANGES OF TEMPERATURE.

The greatest daily range of temperature is shown in the table of miscellaneous meteorological data. The greatest monthly range of temperature occurred at Helena, Mont., where it was 101. From Montana the monthly ranges decreased eastward to less than 50 over Lake Michigan and on the south New England coast, southeastward to less than 30 over extreme southern Florida, and to less than 40 at Port Eads, La., and Galveston, Tex., and westward and southwestward to less than 30 in northwestern and west-central California.

#### COLD WAVES.

From the 1st to the 3d a cold wave advanced from the region north of eastern Montana and North Dakota to the middle Atlantic and New England states, carrying the line of zero temperature to Springfield, Ill., on the 3d, and causing the lowest temperature of the month at Northfield, Vt., -26, on the 4th.

A cold wave of marked severity over the Southern States appeared over eastern Montana and Assiniboina on the 4th and overspread the east Gulf and south Atlantic states during the 6th and 7th. On the 6th the temperature fell to 12 at Atlanta, Ga., and to 32 at Mobile, Ala. The morning of the 7th the temperature was below freezing in northern Florida, reaching 31 at Tampa, Fla., and frost was reported as far south as Jupiter, Fla.

From the 7th to the 9th a cold wave advanced from the Missouri Valley to the Southeastern States, carrying the line of freezing weather to Jacksonville, Fla. The morning of the 9th a cold wave appeared over North Dakota, from which region it advanced to the middle Atlantic and New England states by the evening of the 10th and to the Southeastern States by the morning of the 11th. On the 11th the temperature fell below zero generally in New England, the minimum was below freezing over the north part of the Florida Peninsula, and light frost was reported at Jupiter, Fla.

A cold wave appeared over Alberta on the 10th, overspread the middle Rocky Mountain region on the 11th, reached the lower Missouri and lower Mississippi valleys on the 12th, and the south Atlantic coast on the 13th. The morning of the 14th the temperature fell to freezing, and ice  $\frac{1}{4}$  inch in thickness formed at Titusville, Fla., and heavy frost was reported at Jupiter, Fla.

From the 14th to the 16th a severe cold wave advanced from the middle Rocky Mountain region to the Atlantic coast. On the 15th the temperature was 10 to 15 below zero in the middle Ohio valley. On the 16th the lowest temperature on

record for January at Atlantic City, N. J., -4, was noted, and the minimum fell to -10 at Knoxville, Tenn., and to -4 at Lynchburg, Va. On the 16th and 17th the lowest January temperatures on record were reported at points in the Carolinas. On the 16th the temperature was below freezing in northern Florida. The morning of the 17th the temperature at Jacksonville, Fla., was 24, pineapples in exposed places about Jupiter, Fla., were damaged, and vegetation was reported killed to the southern extremity of the "Everglades."

From the 17th to the 20th a cold wave advanced from the middle plateau region and northeast slope of the Rocky Mountains to the Atlantic and Gulf states. From the 17th to the 20th the weather was cold generally throughout Texas. The morning of the 20th the minimum was 26 at Charleston, S. C., and 22 at Mobile, Ala.

From the 24th to the 26th a cold wave from the Northwest overspread the central valleys and the Lake region, carrying the temperature to -30 at Moorhead, Minn., on the 26th. This cold wave was not severely felt in the Atlantic coast states.

A cold wave advanced from the middle plateau region over the central valleys, the southern lake region, and the Southwest during the 28th and 29th. On the 30th a slight fall in temperature occurred in the Atlantic coast states.

The lowest temperature of the month was noted generally over the Dakotas and Montana on the 31st, and the lowest temperature on record at Helena, Mont., for January, -42, was registered. On that date the temperature was -30 to -40 in Montana and western North Dakota, reached -43 at Havre, Mont., and fell to zero in northern Kansas. On the 30th and 31st the cold was exceptionally severe in the north Pacific coast states.

#### FROST.

In Florida the severest frosts of the month were noted on the 7th, 14th, and 17th. On the 7th ripening strawberries, oranges, and some orange trees were frozen at Flatwood, 2 miles northeast of Eustis, Fla.; frost was reported at Jupiter; ice  $\frac{1}{4}$  inch in thickness and frost were noted at Titusville; and tender vegetation about Tampa was injured by cold. Light frost killed tender vegetation about Jupiter on the 11th and 13th.

On the 14th orange trees were frozen at Flatwood, and heavy frost killed many plants about Jupiter; pineapples were not seriously damaged. At Titusville heavy frost and ice  $\frac{1}{4}$  inch in thickness formed; oranges on trees back from the river were reported frozen solid. At City Point all tender vegetation and bananas and oranges exposed to the westerly wind were killed. Thin ice was reported at Fort Pierce, 92 miles south of Titusville. At Tampa the temperature fell to 31 without causing material damage to fruit.

On the 17th the temperature fell to 24 at Jacksonville, the lowest temperature noted at that station since January 4, 1887. At Titusville a large number of young fish were reported killed by cold. About Jupiter tender vegetation and pineapples in exposed places were injured, and damaging frost was reported to the southern extremity of the "Everglades." At Tampa the minimum temperature, 29, was the lowest noted at that place since 1886, and oranges in exposed places were slightly injured. On the 19th heavy frost injured tender vegetation about Galveston, Tex.

#### PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for January, 1893, as determined from reports of more than 2,000 stations, is exhibited on Chart III. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for regular sta-

tions of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean

when the precipitation is below the normal and subtracting when above.

In January the monthly precipitation is usually greatest on the extreme north Pacific coast, where it exceeds 8.00. At Neah Bay, Wash., 10 years' record, the normal amount is 17.33. On the immediate Pacific coast north of the 40th parallel and in the Sierra Nevada Mountains between the 38th and 41st parallels the average precipitation for January exceeds 8.00. It is 4.00 to 6.00 generally along the Pacific coast north of the 37th parallel. Over the eastern part of the country the greatest precipitation for January is noted at Hatteras, N. C., where it exceeds 6.00; it is more than 4.00 along the immediate middle Atlantic and New England coasts, over east-central Florida, generally in districts south of the Ohio River and east of Texas, in central Utah, and in the mountains east of San Diego, Cal. From the Lake Superior region and the British Northwest Territory to the Rio Grande, Gila, and lower Colorado valleys the monthly precipitation is less than 2.00, except over a part of the northern plateau and the central part of the middle plateau. From Minnesota, North Dakota, and eastern Montana to the Rio Grande River the normal amount is less than 1.00.

In January, 1893, the monthly precipitation was greatest on the extreme north Pacific coast, where 11.33 fell at Neah Bay, Wash. The monthly amount exceeded 8.00 in the mountains of California between the 38th and 40th parallels, and in the northern part of Santa Cruz county, California. At Saugeen, Ont., the monthly precipitation was 6.11, and the monthly amount was in excess of 4.00 generally along the immediate Pacific coast from Vancouver Island to southern California, in the mountains of central Colorado, on the Texas coast, about Corpus Christi, Tex., in western Lower Michigan, in Ontario from Georgian Bay to Lake Erie, and in Nova Scotia. Over the greater part of the country between the Mississippi River and the Sierra Nevada Mountains the monthly precipitation was less than 1.00, and over the greater part of the southern plateau, in Wyoming, and from western Texas over Kansas, Nebraska, and eastern Colorado, the monthly amount was less than 0.25.

#### DEPARTURE FROM NORMAL PRECIPITATION.

The monthly precipitation was generally deficient, except over the northern lake region, and from the Dakotas and the northeast slope of the Rocky Mountains over Wyoming, central Colorado, Nevada, and a part of southern California, where it was slightly in excess of the normal amount for January. The most marked deficiency was noted along the immediate north Pacific coast, where the monthly amount was 6.00 to 8.00 below the normal. The deficiency was more than 4.00 along the immediate Pacific coast north of the 40th parallel, and in an area covering Tennessee, northern Alabama, northern Mississippi, and eastern Arkansas, and was more than 2.00 at Eastport, Me., on the Carolina coast, at Jacksonville, Fla., from the west Gulf coast over the middle Mississippi and lower Ohio valleys, southern Kentucky, and the west parts of Virginia and the south Atlantic states. The greatest excess in monthly precipitation, 3.30, was reported at Los Angeles, Cal. At Saugeen, Ont., the monthly amount was more than 2.00 in excess, and at Winnipeg, Man., Fort Buford, N. Dak., and Medicine Hat, N. W. T., it was more than 1.00 in excess of the normal precipitation for January.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for January for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for January, 1893; (4) the departure of the current month from the average; (5) and the extremes for January during the period of observation and the years of occurrence:

State and station.	Departure from average precipitation.						
	(1) Average for the month of Jan.	(2) Length of record.	(3) Total for Jan., 1893.	(4) Departure from average.	(5) Extremes for January.		
					Greatest.	Least.	
	(1)	(2)	(3)	(4)	Am't.	Year.	Am't.
Arizona.	Inches.	Years	Inches.	Inches.	Inches.	Am't.	Year.
Fort Apache	1.26	17	0.26	- 0.98	3.90	1886	0.18
Fort Mohave	0.77	21	T.	- 0.77	4.15	1889	0.00
Whipple Barracks	1.40	21	1.18	- 0.22	5.99	1886	0.00
Arkansas.							
Keesee Ferry	3.02	11	0.50	- 2.52	7.37	1890	0.50
California.							
Fort Bidwell	3.10	21	2.60	- 0.50	10.00	1881	0.03
Riverside	1.39	12	2.87	+ 1.48	4.28	1890	0.00
Colorado.							
Las Animas	0.32	11	0.00	- 0.32	0.85	1891	0.00
Florida.							
Merritts Island	3.40	15	1.40	- 2.00	10.45	1878	0.42
Georgia.							
Forsyth	5.03	19	2.58	- 2.45	10.08	1883	2.22
Idaho.							
Boise Barracks	2.34	19	0.62	- 1.72	4.60	1872	T.
Fort Sherman	3.10	10	0.85	- 2.25	4.81	1890	0.85
Indiana.							
Lafayette	2.28	13	1.62	- 0.66	6.11	1880	0.40
Indian Territory.							
Fort Supply	0.65	14	0.02	- 0.63	2.67	1891	0.00
Iowa.							
Cresco	1.33	21	1.16	- 0.17	3.72	1886	0.38
Kansas.							
Independence	1.68	21	0.17	- 1.51	3.17	1890	0.17
Salina	0.84	10	T.	- 0.84	1.76	1890	T.
Louisiana.							
Grand Coteau	6.59	10	3.06	- 3.51	13.30	1883	2.53
Maine.							
Orono	4.72	22	.....	.....	7.66	1891	2.00
Maryland.							
Cumberland	2.21	21	0.72	- 1.49	3.90	1878	0.30
Michigan.							
Kalamazoo	2.30	17	1.53	- 0.77	4.90	1876	1.10
Missouri.							
Sedalia	2.06	14	0.64	- 1.42	4.01	1885	0.19
Montana.							
Fort Custer	0.84	13	0.67	- 0.17	2.85	1884	0.08
Nebraska.							
Fort Robinson	0.62	9	0.44	- 0.18	1.56	1892	0.06
Genoa (near)	0.97	17	0.19	- 0.78	2.68	1891	0.19
Nevada.							
Browns	0.69	22	0.48	- 0.21	3.22	1875	0.00
Carson City	2.32	16	3.18	+ 0.86	6.78	1875	0.10
New Hampshire.							
Hanover	2.94	22	1.32	- 1.62	4.82	1887	0.45
New Mexico.							
Deming	0.43	10	0.19	- 0.24	1.09	1889	0.00
Fort Wingate	1.14	21	0.48	- 0.66	3.30	1872	0.16
New York.							
Cooperstown	2.62	22	1.89	- 0.73	5.54	1891	0.52
Plattisburg Barracks	1.84	22	0.89	- 0.95	4.30	1892	0.59
North Carolina.							
Lenoir	4.49	21	2.31	- 2.18	9.60	1878	1.10
Oklahoma.							
Fort Reno	0.93	8	0.30	- 0.63	2.04	1890	0.00
Fort Sill	1.09	21	2.95	+ 1.86	3.80	1891	0.00
Oregon.							
Bandon	11.24	15	.....	.....	20.75	1890	4.60
Pennsylvania.							
Duberry	3.20	22	2.12	- 1.06	5.65	1892	0.70
Grampian	3.74	22	4.12	+ 0.35	5.47	1888	1.21
Wellboro	6.23	13	4.92	- 1.31	12.17	1886	1.98
South Carolina.							
Stateburg	3.77	11	2.76	- 1.01	6.65	1892	0.90
South Dakota.							
Fort Sully	0.44	22	0.90	+ 0.46	1.03	1887	T.
Texas.							
Austin	2.44	21	0.45	- 1.99	8.03	1889	0.00
Silver Falls	0.87	5	0.76	- 0.11	1.28	1891	0.44
Utah.							
Terrace	0.58	21	1.20	+ 0.62	2.15	1875	0.00
Vermont.							
Stratford	3.67	19	1.90	- 1.77	6.10	1891	1.70
Virginia.							
Dale Enterprise	3.03	13	1.14	- 1.89	5.96	1886	0.57
Washington.							
Fort Townsend	2.68	18	1.69	- 0.99	4.65	1890	1.00
West Virginia.							
Parkersburg	3.46	7	.....	.....	6.75	1885	1.54
Wisconsin.							
Embarrass	2.41	22	.....	.....	4.65	1880	0.55
Madison	1.92	22	1.06	- 0.86	3.65	1874	0.40
Wyoming.							
Fort Washakie	0.63	10	0.05	- 0.58	1.43	1891	0.04

Considered by districts the average percentage of the normal in districts where the precipitation was deficient was about as follows: middle-eastern slope of the Rocky Mountains, 6; west Gulf states, 22; northern plateau, 28; Missouri Valley, 41; upper Mississippi valley, 46; Ohio Valley and Tennessee, 49; north Pacific coast, 50; east Gulf states, 53; southern plateau, 56; south Atlantic states, 59; middle Atlantic states and middle Pacific coast, 60; New England, 62;

lower lake region, 67; southeast slope of the Rocky Mountains, 76. In districts where the monthly precipitation was in excess the percentage of the normal was about as follows: Extreme northwest, 158; south Pacific coast, and at Key West, Fla., 139; middle plateau, 119. In the upper lake region and on the northeast slope of the Rocky Mountains the monthly precipitation averaged about normal.

## YEARS OF GREATEST PRECIPITATION FOR JANUARY.

At Moorhead, Minn., and Fort Buford, N. Dak., the precipitation for the current month was the greatest reported for January during the respective periods of observation. In an area extending from central Arkansas over eastern Missouri, central Illinois, central Indiana, and central Ohio the greatest precipitation for January was noted in 1890; in an area extending from eastern Kentucky to the west Gulf coast in 1882; over northern California in 1878; and along the middle and lower Ohio river in 1876.

## YEARS OF LEAST PRECIPITATION FOR JANUARY.

At Northfield, Vt., Galveston, San Antonio, and El Paso, Tex., Shreveport, La., Little Rock and Keeses Ferry, Ark., Memphis, Nashville, and Chattanooga, Tenn., Cairo and Springfield, Ill., Saint Louis, Mo., Des Moines, Iowa, Leavenworth, Salina, and Independence, Kans., Genoa (near), Nebr., Denver and Las Animas, Colo., Spokane and Olympia, Wash., and Portland, Oregon, the precipitation for the current month was the least reported for January during the respective periods of observation. On the northeast slope of the Rocky Mountains the least precipitation for January was noted in 1891; on the Pacific coast north of the 38th parallel in 1889; over the southern Rocky Mountain and southern plateau regions and along the south Pacific coast in 1887; and from the middle Ohio river to the Atlantic coast between the 38th and 40th parallels in 1872.

## EXCESSIVE PRECIPITATION.

The following tables show, by states, the number of stations reporting monthly precipitation to equal or exceed 10.00; precipitation to equal or exceed 2.50 in 24 hours; and precipitation to equal or exceed 1.00 in 1 hour in January, 1893:

## Monthly precipitation to equal or exceed 10.00.

State.	Number of stations.	State.	Number of stations.
California .....	3	Washington .....	1

## Precipitation to equal or exceed 2.50 in 24 hours.

State.	Number of stations.	Dates.	State.	Number of stations.	Dates.
California .....	17	16, 26, 26-27, 27, 29-30, 30, 30-31, 31.	Florida .....	1	24.
Georgia .....	4	6, 18, 18-19, 19.	Nevada .....	1	30.
Mississippi .....	4	*31-1, 1, 16-17.	Oklahoma .....	1	17.
Alabama .....	3	17, 18, 18-19.	Oregon .....	1	17.
Louisiana .....	2	17-18.	South Carolina .....	1	18-19.
Washington .....	2	3-4.	Texas .....	1	25-26.
			Virginia .....	1	1.

## Precipitation to equal or exceed 1.00 in 1 hour.

Texas .....	1	26.	.....	.....

\* December 31, 1892-January 1, 1893.

Table of excessive precipitation, January, 1893.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall 1 inch, or more, in one hour.	
		Amt.	Day.	Amt.	Time.
Alabama.	Inches.	Inches.	Inches.	h. m.	Day.
Brewton .....	2.82	18-19	1.00	1 00	12
Healing Springs .....	2.70	17	.....	.....	.....
Union Springs a .....	2.55	18	.....	.....	.....
California.	10.04	.....	.....	.....	.....
Boulder Creek .....	3.90	31	.....	.....	.....
Claremont .....	4.66	30-31	.....	.....	.....
Colegrove .....	5.47	30-31	.....	.....	.....
Duarte .....	3.60	26	.....	.....	.....
Edmonton .....	11.47	2.65	16	.....	.....
Georgetown .....	3.15	26-27	.....	.....	.....
Do .....	6.75	30	.....	.....	.....
Glendora .....	2.56	27	.....	.....	.....
Grass Valley a .....	2.56	27	.....	.....	.....
Grass Valley b .....	3.29	30-31	.....	.....	.....
Los Angeles (W. B.) .....	4.87	26-27	.....	.....	.....
Los Gatos b .....	2.85	29-30	.....	.....	.....
Do .....	3.38	27	.....	.....	.....
Mount Glenwood .....	2.78	27	.....	.....	.....
Nevada City .....	2.67	30-31	.....	.....	.....
Nordhoff .....	4.00	26-27	.....	.....	.....
Oleta .....	5.34	30-31	.....	.....	.....
Pasadena .....	2.57	30	.....	.....	.....
Rialto .....	2.66	30	.....	.....	.....
Santa Barbara a .....	Florida.	2.76	24	.....	.....
Hypoluxo .....	Georgia.	2.50	18	.....	.....
Camak .....	2.73	18-19	.....	.....	.....
Dublin .....	2.54	19	.....	.....	.....
Louisville .....	3.40	16	.....	.....	.....
Marshallville .....	Louisiana.	2.90	17-18	.....	.....
Clinton .....	2.80	17-18	.....	.....	.....
Houma .....	Mississippi.	3.60	1	.....	.....
Batesville .....	3.57	*	.....	.....	.....
Greenville a .....	3.32	.....	.....	.....	.....
Greenville b .....	3.42	16-17	.....	.....	.....
Hattiesburg .....	Nevada.	2.50	30	.....	.....
Palmetto .....	Oklahoma Territory.	2.60	17	.....	.....
Langlois .....	Oregon.	2.98	14	.....	.....
Trial .....	South Carolina.	3.55	18-19	.....	.....
Corpus Christi .....	Texas.	2.51	25-26	1.85	1 00
Avon .....	Virginia.	3.40	1	.....	.....
Neah Bay .....	Washington.	11.33	4.83	3-4	.....
Tatoosh Island .....	4.50	3-4	.....	.....	.....

Received too late for publication in December, 1892.

Arkansas.				
Arkansas City .....	2.55	31	.....	.....
Mount Glenwood .....	14.72	2.55	3	.....
Do .....	5.50	24	.....	.....
San Luis Obispo .....	2.63	24	.....	.....

\* December 31, 1892-January 1, 1893.

## MAXIMUM RAINFALL IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfall during January, 1893, for periods of five and ten minutes and one hour, as reported by regular stations of the Weather Bureau furnished with self-registering gauges:

## Maximum rainfall in one hour or less.

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
Atlanta, Ga.*	Inch. 0.07	14, 28	Inch. 0.10	14, 28	Inch. 0.29	14
Bismarck, N. Dak.*	.....	.....	.....	.....	.....	.....
Boston, Mass.*	.....	.....	.....	.....	.....	.....
Buffalo, N. Y.*	.....	.....	.....	.....	.....	.....
Cincinnati, Ohio.*	.....	.....	.....	.....	.....	.....
Chicago, Ill.*	.....	.....	.....	.....	.....	.....
Cleveland, Ohio.*	.....	.....	.....	.....	.....	.....
Denver, Colo.*	.....	.....	.....	.....	.....	.....
Detroit, Mich.*	.....	.....	.....	.....	.....	.....
Dodge City, Kans.*	.....	.....	.....	.....	.....	.....
Duluth, Minn.*	.....	.....	.....	.....	.....	.....
Eastport, Me.*	.....	.....	.....	.....	.....	.....

\* December 31, 1892-January 1, 1893.

## Maximum rainfall in one hour or less—Continued.

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
Galveston, Tex.	Inch. 0.03	18	Inch. 0.05	18	Inch. 0.06	18
Indianapolis, Ind.	0.05	19	0.07	19	0.22	19
Jacksonville, Fla.	0.10	29	0.20	29	0.33	29
Jupiter, Fla.	0.12	1	0.20	24	0.62	24
Kansas City, Mo.						
Key West, Fla.						
Marquette, Mich.						
Memphis, Tenn.						
Milwaukee, Wis.						
New Orleans, La.	0.06	18	0.09	18	0.15	18
New York, N. Y.	0.11	1	0.15	1	0.30	1
Norfolk, Va.	0.09	29	0.17	29	0.39	29
Omaha, Nebr.						
Philadelphia, Pa.	0.02	2	0.04	2	0.12	2
Philadelphia Water Works						
Pittsburg, Pa.						
Portland, Oregon						
Saint Louis, Mo.						
Saint Paul, Minn.						
Salt Lake City, Utah						
San Diego, Cal.	0.03	27	0.05	27	0.11	30
San Francisco, Cal.						
Savannah, Ga.						
Tampa, Fla.	0.07	19	0.11	19	0.31	19
Washington, D. C.	0.03	1	0.05	1	0.15	1
Wilmington, N. C.	0.06	1	0.09	1	0.31	1

\* Record incomplete on account of snow.

† Self-register out of order.

‡ Less than 0.05 in 1 hour.

The following tables show the number of years for which monthly precipitation to equal or exceed 10.00 inches, daily precipitation to equal or exceed 2.50 inches, and hourly precipitation to equal or exceed 1.00 inch has been reported in the several states and territories for January during the last 23 years:

## Excessive monthly precipitation.

State.	No. years noted.	State.	No. years noted.
California	16	Ohio	1
Washington	14	South Carolina	1
Oregon	13	Arizona	0
Louisiana	9	Colorado	0
Georgia	8	The Dakotas	0
North Carolina	8	Delaware	0
New York	7	District of Columbia	0
Tennessee	7	Idaho	0
Alabama	7	Indian Territory	0
Texas	5	Iowa	0
Mississippi	5	Maine	0
Arkansas	4	Maryland	0
Indiana	3	Michigan	0
Massachusetts	3	Minnesota	0
Florida	3	Montana	0
Illinois	2	Nebraska	0
New Jersey	2	New Mexico	0
Virginia	2	Pennsylvania	0
Connecticut	1	Rhode Island	0
Kansas	1	Utah	0
Kentucky	1	Vermont	0
Missouri	1	West Virginia	0
Nevada	1	Wisconsin	0
New Hampshire	1	Wyoming	0

## Excessive daily precipitation (24 hours).

Louisiana	15	Missouri	3
Tennessee	14	Indian Territory	2
North Carolina	13	Arizona	2
Texas	12	Maine	2
Georgia	12	Maryland	2
Florida	10	Nevada	2
Oregon	9	New Hampshire	2
California	9	Utah	2
Mississippi	8	Delaware	1
Alabama	8	Idaho	1
Virginia	7	Michigan	1
Washington	7	Nebraska	1
Massachusetts	6	Vermont	1
New York	6	Colorado	0
South Carolina	6	District of Columbia	0
Arkansas	5	The Dakotas	0
Illinois	5	Kansas	0
Indiana	5	Minnesota	0
Ohio	5	Montana	0
Pennsylvania	5	New Mexico	0
Kentucky	4	Rhode Island	0
New Jersey	4	West Virginia	0
Connecticut	3	Wisconsin	0
Iowa	3	Wyoming	0

## Excessive hourly precipitation.

State.	No. years noted.	State.	No. years noted.
Texas	1	Michigan	0
Illinois	1	Massachusetts	0
Alabama	1	Minnesota	0
California	1	Mississippi	0
Florida	1	Missouri	0
Georgia	1	Montana	0
North Carolina	1	Nebraska	0
Tennessee	1	Nevada	0
Arkansas	0	New Hampshire	0
Arizona	0	New Jersey	0
Connecticut	0	New Mexico	0
The Dakotas	0	New York	0
Delaware	0	Ohio	0
District of Columbia	0	Oregon	0
Idaho	0	Pennsylvania	0
Indiana	0	Rhode Island	0
Indian Territory	0	South Carolina	0
Iowa	0	Utah	0
Kansas	0	Vermont	0
Kentucky	0	Virginia	0
Louisiana	0	Washington	0
Maine	0	West Virginia	0
Maine	0	Wisconsin	0
Maryland	0	Wyoming	0

The following tables give exceptionally heavy monthly, daily, and hourly precipitation reported for January during the last 23 years:

## Monthly.

Station and state.	Am't.	Year.	Station and state.	Am't.	Year.
Upper Mattole, Cal.	Inches. 41.63	1888	Astoria, Oregon	Inches. 22.16	1871
Do	33.40	1889	Iowa Hill, Cal.	20.87	1889
Neah Bay, Wash.	30.50	1874	Cisco, Cal.	20.86	1881
Emigrant Gap, Cal.	25.69	1881	Red Bluff, Cal.	20.71	1878
Redding, Cal.	22.69	1878	Calistoga, Cal.	20.64	1878
Neah Bay, Wash.	22.30	1887	Tatoosh L. H., Wash.	20.50	1871
Ferndale, Cal.	22.17	1889	Alta, Cal.	20.00	1881

## Daily (24 hours).

Station and state.	Amount.	Date.	Station and state.	Amount.	Date.
Upper Mattole, Cal.	Inches. 31.68	27-31, 1888	Shreveport, La.	Inches. 5.71	13, 1885
Do	11.10	10-14, 1892	Fostoria, Tenn.	5.70	14-15, 1885
Montgomery, Ala.	9.98	12-13, 1892	Daphne, Ala.	5.62	11-12, 1892
Canton, Ga.	8.95	10-13, 1892	Resaca, Ga.	5.61	12-13, 1892
Hydesville, Cal.	8.86	28-31, 1888	Clintonville, Ala.	5.50	23-24, 1885
Brewton, Ala.	8.55	12-13, 1892	Julian, Cal.	5.50	26-29, 1892
Point Pleasant, La.	8.40	1-2, 1886	Dale Enterprise, Va.	5.49	8-9, 1886
Fort Ross, Cal.	8.20	1-2, 1892	Duarte, Cal.	5.47	30, 1893
Wiggins, Ala.	7.47	11-13, 1892	Mahanoy Plane, Pa.	5.45	4-5, 1886
Emory Grove, Md.	7.00	30, 1879	Fort Barrancas, Fla.	5.42	12-13, 1892
Portland, Oregon	6.86	5-6, 1883	Cheneyville, La.	5.40	29, 1891
Rome, Ga.	6.83	11-13, 1892	Pasadena, Cal.	5.34	30-31, 1893
Greensboro, Ala.	6.77	2-3, 1886	Pana, Ill.	5.25	
Glendora, Cal.	6.75	30, 1893	Marietta, Ga.	5.22	12-14, 1892
Clarksville, Tex.	6.52	1-17, 1875	Fulton, Ark.	5.20	1, 1890
Marion, Ala.	6.50	2-3, 1886	Cairo, Ill.	5.17	17-18, 1876
Huntsville, Tex.	6.45	2, 1890	Tallasseee Falls, Ala.	5.10	12-13, 1892
Jupiter, Fla.	6.38	11-12, 1889	Kenton, Ohio	5.10	27-28, 1876
Neah Bay, Wash.	6.15	6-7, 1885	Forestville, Cal.	5.08	1, 1892
Diamond, Ga.	6.07	12-13, 1892	Tuscaloosa, Ala.	5.00	2-3, 1886
Fayette, Miss.	6.00	6, 1883	Delhi, La.	5.00	22-23, 1887
Fayetteville, N. C.	6.00	8-9, 1879	Point Pleasant, La.	5.00	7-8, 1886
Houston, Tex.	5.89	7-8, 1891	Jeanerette, La.	5.00	8, 1891
Oxanna, Ala.	5.74	11-12, 1892	Lake Charles, La.	5.00	8, 1891
Jackson Barracks, La.	5.72	11-12, 1892	Mount Willing, Ala.	5.00	12, 1892

December 31, 1889—January 1, 1890.

## One hour and less.

Station and state.	Amount.	Time.	Date.
Galveston, Tex.	Inches. 0.25	0 05	15, 1890
Key West, Fla.	0.25	0 05	22, 1891
Jacksonville, Fla.	0.23	0 05	11, 1892
Atwood, Ill.	4.36	1 00	12, 1890

## SNOW (in inches and tenths).

Chart V shows the depth of snowfall reported for the month.

The heaviest snowfall for the month, 79.0, was noted at Summit, Cal. 58.0 fell at Pikes Peak, Colo. A depth of 40.0 to 50.0 was reported in the mountains of Colorado, and in southwestern Lower Michigan, extreme north-central Indiana, and at Oswego, N. Y., and 30.0 to 40.0 fell at Oakland, Md., in western Lower Michigan and the interior of eastern Upper Michigan, at Sandy Lake Dam, Minn., at Palmetto, Nev., and Port Angeles, Wash. At Calais, Me., in an area covering central and northern New Jersey and southeastern Pennsylvania, at points in central New York and near eastern Lake Ontario, in central North Carolina and thence to southeastern Virginia, in an area covering northeastern Ohio and the Alleghany Mountain region from northwestern Pennsylvania to extreme eastern Tennessee, generally over Upper and Lower Michigan, and thence over eastern Indiana and western Ohio the monthly snowfall exceeded 20.0. The depth of snowfall also exceeded 20.0 in north-central Minnesota, in adjoining parts of northwestern North Dakota and northeastern Montana, at stations in the middle Rocky Mountain region, in northeastern Nevada, in the Sierra Nevada Mountains, and in northwestern Washington. The monthly snowfall exceeded 10.0 generally in the middle Atlantic and New England states, in northern portions of the south Atlantic and Gulf states, in central Arkansas, in the Ohio, extreme upper Mississippi and the Red River of the North valleys, in the Lake region, on the north Pacific coast, and in areas in the middle and northern Rocky Mountain regions. Trace of snow was noted over the north part of the Florida Peninsula and to the immediate middle Gulf coast during the storm of the 18-19th. Trace of snow was also noted near San Antonio, Tex.

On the 5th and 6th heavy snow impeded railroad traffic in southern New England, eastern New York, eastern Pennsylvania, and New Jersey. Along the middle Atlantic and New England coasts vessels were snowbound. A heavy snow-storm, with high wind, prevailed in Upper Michigan and western Lower Michigan from the 8th to 10th; at Marquette snow drifted to a depth of 4 to 5 feet; at Manistee business was practically suspended; railroad traffic was interfered with about Grand Haven. On the 10th drifting snow interfered with railroad traffic in Pennsylvania. On the 10-11th drifting snow delayed trains about Oswego, N. Y. On the 13th snow interrupted railroad and street traffic at Buffalo, N. Y. At Columbia, S. C., snow fell from 11 a. m. to 1 p. m., 13th. On the 13th and 14th drifting snow delayed trains at Dubuque, Iowa. On the 14th heavy snow interrupted traffic and telegraphic communication at Cincinnati, Ohio. Heavy, drifting snow impeded railroad travel about Oswego, N. Y., on the 15th and 16th.

From the 17th to the 19th an exceptionally heavy snow-storm extended eastward over the Gulf and south Atlantic states. At Little Rock, Ark., the snowfall, 13 inches, was the heaviest on record at that station.

The following table shows the time of beginning and ending, and the total depth of snow reported during this storm, at stations in the south Atlantic and east Gulf states and Arkansas:

*Snowfall in Southern States during January 17-19, 1893.*

Station.	Beginning and ending.	Depth.
<i>North Carolina.</i>		
Charlotte	10-35 a. m., 18th, to noon, 19th	7.5
Raleigh	4-30 p. m., 18th, to 1.20 p. m., 19th	12.0
Kittyhawk	9 p. m., 18th, to 1 a. m., 19th	4.0
Southport	At intervals, 18-19th	1.1
Chapel Hill	a. m. to 3 p. m., 18th	8.0
Fayetteville	2.50 p. m., 19th, to a. m., 20th	5.2
Liflington	3 p. m., 18th, to 8 a. m., 19th	11.5
Louisburg	6 p. m., 18th, to 2 p. m., 19th	12.0
Mount Holly	11 a. m., 18th, to 1 p. m., 19th	8.0
Oak Ridge	1 p. m., 18th, to a. m., 19th	6.0
Smithfield	5 p. m., 18th, to 2 p. m., 19th	9.0
Douglas	11 a. m., 18th, to a. m., 19th	6.5
Salisbury	a. m., 18th, to a. m., 19th	7.0
Highlands	6 a. m., 18th, to night	8.0

*Snowfall in Southern States—Continued.*

Station.	Beginning and ending.	Depth.
<i>North Carolina—Cont'd.</i>		
Horse Cove	7 a. m. to midnight, 18th	7.4
Tarboro	6.30 p. m., 18th, to 2.30 p. m., 19th	6.0
Littleton	18th	6.0
Weldon	8 p. m., 18th, to 12.30 p. m., 19th	7.0
Marion	18th	6.0
Mount Pleasant	11 a. m., 18th, to noon, 19th	9.0
Soapstone Mount	11 a. m., 18th, to 10 a. m., 19th	9.0
Wileyton	a. m., 19th, to noon	5.5
Columbus	17-18th	6.0
Pittsboro	2 p. m., 18th, to 11 a. m., 19th	12.0
<i>South Carolina.</i>		
Charleston	9 a. m. to 3.08 p. m., 18th	1.9
Columbia	9 a. m., 18th, to 6 a. m., 19th	4.0
Aiken	10 a. m., 18th, to 2.30 a. m., 19th	7.5
Simpsonville	9.15 a. m., 18th, to 9.30 a. m., 19th	7.0
Greenville	19-20th	8.5
Greenwood	18th	5.5
Anderson	19th	9.0
Longshore	18-19th	8.0
<i>Georgia.</i>		
Atlanta	3 a. m., 18th, to a. m., 19th	9.5
Augusta	9 a. m., 18th, to 11.30 a. m., 19th	3.5
Savannah	6 a. m. to 12.30 p. m., 18th	1.0
Lafayette	a. m., 18th, to a. m., 20th	10.0
Athens	Early a. m., to 10 a. m., 18th	10.0
Adairsville	a. m., 18th, to 6.30 a. m., 19th	11.0
Dahlonega	6 a. m., 18th, to 8 a. m., 19th	12.0
Forsyth	3 a. m., 18th, to 8 a. m., 19th	4.0
Gillsville	5 a. m., 18th, to 7 a. m., 19th	11.0
Hephzibah	9 a. m. to 11 p. m., 19th	4.5
LaGrange	18-19th	5.5
Poindexter	6 a. m., 18th, to 10 a. m., 19th	9.0
Diamond	5 a. m., 18th, to 7 a. m., 19th	5.4
Lithia Springs	18-19th	7.0
Louisville	19th	4.0
Marietta	4 a. m., 18th, to 9 a. m., 19th	9.0
Milledgeville	18-19th	4.5
Rome	3 a. m., 18th, to 1 a. m., 19th	2.5
Toccoa	18th	10.0
Union Point	19th	6.8
Washington	18th	8.0
Resaca	4 a. m., 18th, to 3 a. m., 19th	9.0
Whitesburg	3 a. m., 18th, to 8 a. m., 19th	7.0
Canton	4 a. m., 18th, to 7 a. m., 19th	10.0
<i>Alabama.</i>		
Mobile	5.55 to 9.30 p. m., 17th	1.0
Montgomery	1 a. m., 18th, to a. m., 19th	2.2
Auburn	3 a. m. to 6 p. m., 18th	2.0
Talladega	Early a. m. to 6.30 a. m., 18th	7.0
Tuscumbia	11.15 p. m., 17th, to 7 a. m., 18th	10.0
Gadsden	2 a. m., 18th, to 5.30 a. m., 19th	13.5
Decatur	11.30 p. m., 17th, to 10 p. m., 18th	10.0
Florence	Early a. m. to 5 p. m., 18th	7.5
Lynn	Early a. m., 18th, to a. m., 19th	9.3
Scottsboro	11 p. m., 17th, to 4 p. m., 18th	8.0
Cordova	a. m., 18th, to a. m., 19th	8.0
Warrior	a. m., 18th, to a. m., 19th	9.0
Florence	18th	10.5
Fayette	17-18th	10.0
Oxanna	1 a. m., 18th, to 6 a. m., 19th	9.9
<i>Mississippi.</i>		
Meridian	8.10 p. m., 17th, to 4 a. m., 18th	2.0
University	9.30 p. m., 17th, to 6 p. m., 18th	11.0
Vicksburg	4.05 p. m., 17th, to a. m., 19th	3.4
Duck Hill	17-18th	8.7
Hattiesburg	3.10 p. m., 16th, to 11.40 p. m., 17th	4.5
Louisville	8 p. m., 17th, to p. m., 18th	6.5
Okolona	9 p. m., 17th, to 5 p. m., 18th	10.0
Palo Alto	9 p. m., 17th, to 5 p. m., 18th	8.0
Clarksdale	7 p. m., 17th, to 11 a. m., 18th	10.0
Pontotoc	9 p. m., 17th, to 8 p. m., 18th	12.0
Greenville	5 p. m., 17th, to 2 p. m., 18th	4.0
Agricultural College	7 p. m., 16th, to 7 a. m., 17th	5.0
Batesville	8.30 p. m., 17th, to noon, 18th	8.0
Columbus	a. m., 18th, to a. m., 19th	7.0
Corinth	On 17th	10.0
<i>Arkansas.</i>		
Little Rock	5 p. m., 17th, to 10.52 a. m., 18th	13.0
Fort Smith	10 a. m., 17th, to a. m., 18th	10.5
Kirby	Midnight, 17th, to 2 a. m., 18th	12.0
Ozark	11.30 a. m. to 11.30 p. m., 17th	9.0
Stuttgart	6 p. m., 17th, to 2 a. m., 18th	12.0
Brinkley	7 p. m., 17th, to a. m., 18th	11.0
New Gascony	4 p. m., 17th, to 6 a. m., 18th	10.0
Dallas	10 a. m. to 10 p. m., 17th	10.0
Pine Bluff	4 p. m., 17th, to a. m., 18th	11.0
Forrest	7 p. m., 17th, to 4 a. m., 18th	9.5
Winslow	10.30 a. m. to midnight, 17th	7.5
Conway	3 p. m., 17th, to 4 a. m., 18th	10.2
Fayetteville	11 a. m., 17th, to a. m., 19th	7.8
Keesees Ferry	3 p. m., 17th, to a. m., 18th	5.8
Madding	17th	11.0
Rogers	Noon to 10 p. m., 17th	8.0
Warren	18th	6.0

On the 29th high wind drifted snow to a depth of 5 feet about Sault Ste. Marie, Mich. On the 31st snow, drifted by high northwest wind, interfered with traffic about Duluth, Minn.

DEPTH OF SNOW ON GROUND ON THE 15TH AND AT THE CLOSE OF THE MONTH.

Chart VI shows the depth of snow reported on the ground

on the 15th. In northern New England, northern New Jersey, at points in eastern Pennsylvania, in western Pennsylvania and western New York, in the middle and upper Ohio valleys, eastern Kentucky, extreme eastern Tennessee, in the mountains of West Virginia, western Virginia, and western North Carolina, in the Lake region and extreme upper Mississippi valley, in north-central North Dakota, and at mountain stations in Colorado a depth to exceed 10.00 was noted on the 15th. In an area extending over western Lower Michigan, eastern Upper Michigan, and northern Indiana a depth of more than 20.00 was reported. Trace of snow was reported in the northern and western portions of the south Atlantic states, in central and eastern Tennessee, southeastern Kansas, northern New Mexico, Utah, and Nevada, and in interior and eastern parts of Oregon and Washington.

Chart VII shows the depth of snow reported on the ground at the close of the month. In extreme northern and eastern Upper Michigan, and at Manistee, Mich., Blue Knob, Pa., Koopenick, Wis., Martin, Idaho, Elk Park, Mont., and Waterville, Wash., a depth of 30.00, or more, was reported. In northern Lower Michigan, eastern and northern Upper Michigan, in interior and north-central parts of Wisconsin, at Dubuque, Iowa, Humphrey and Palermo, N. Y., and Kingwood, W. Va., in west-central Minnesota, and at Port Angeles, Wash., a depth of 20.00, or more, was noted. The ground was covered by 10.00, or more, generally in New Hampshire and Vermont, in areas in interior and western New York, at points in the mountain districts of Pennsylvania, Maryland, and West Virginia, and generally in the upper lake region, except in southeastern Lower Michigan and on the southwest shore of Lake Michigan. The depth also exceeded 10.00 in the extreme upper Mississippi valley, in northern North Dakota and northeastern Montana, at points in the mountains of Colorado and north-central New Mexico, in an area extending from western Montana over Idaho and northern Nevada, and at stations in interior and northwest parts of Washington. Trace of snow was reported on the ground in the Alleghany Mountains to extreme western North Carolina, in central and northern parts of Ohio, Illinois, Missouri, and Kansas, in the mountains of west-central New Mexico, in central and northern parts of Utah and Nevada, in northeastern California, and extreme southern Oregon.

The first snow of the season was reported as follows: 4th, Strawberry Plains, Tenn. 6th, Paris, Tex. 7th, Tuscumbia, Ala. 10th, Plain Dealing, La. 12th, Murphy, N. C.; Parksville and Sweetwater, Tenn. 13th, Toccoa, Ga.; Charleston, Tenn. 16th, Monroe, La.; Hattiesburg, Miss.; Devine and Mountain Springs, Tex. 17th, Greensboro, Scottsboro, and Selma, Ala.; Arkadelphia and Eldorado, Ark.; Lehigh and Purcell, Ind. T.; Clinton, Houma, Liberty Hill, Roseland, and Winnsboro, La.; Corinth, Miss.; Childress, Corsicana, Fredericksburg, and Mesquite, Tex. 18th, Cordova, Decatur, Demopolis, Mount Willing, Newburg, Oxanna, Sturdevant, and Talladega, Ala.; Adairsville, Diamond, Gillsville, Homerville, Lafayette, and Union Point, Ga.; Amite, Farmerville, and Girard, La.; Columbus, Miss.; Highlands, N. C.; Albany, Duval, Eastland, Grape Vine, Llano, and Round Rock, Tex. 25th, Redding, Cal.; 26th, Fouts Springs and Iowa Hill, Cal.

#### MONTHLY SNOWFALL.

Monthly snowfall of 10 inches, or more, was reported as follows, and in states and territories where the maximum depth was below that amount the station reporting the greatest is given:

*Alabama*.—Lynn (b), 13.8; Gadsden, 13.5; Healing Springs, 13; Lynn (a), 13; Newburg and Tuscumbia (a), 11; Florence (b), 10.7; Decatur (a), Fayette, and Florence (a), 10. *Arizona*.—Flagstaff, 18. *Arkansas*.—Hot Springs, 20; Little Rock, Lonoke, and Mount Nebo, 13; Kirby and Stuttgart,

12; Brinkley, Madding, and Pine Bluff, 11; Russellville, 10.5; Conway, 10.2; Dallas, Dardanelle, Helena (b), and New Gascony, 10.

*California*.—Summit, 79; Edmanton, 51; Emigrant Gap, 35; Cisco, 32; Sisson, 28; Susanville, 24; Truckee, 23; Boca and Dunsmuir, 22; Fort Bidwell, 21.2; Delta, 16.5; Shasta, 11.5; Sims, 11. *Colorado*.—Pikes Peak, 58.3; Climax, 46; Cumbres, 35; Breckenridge, 24.5; Red Cliff, 19; Montrose, 16; Rico, 14.8; Ward District, 14.5; Arboles, 14; Alma, 13.5; Manhattan, 10. *Connecticut*.—Colchester, 22; North Franklin, 19; New Haven, 18.1; Wallingford, 17; Falls Village, 16.8; New Hartford (a), 16.5; Lebanon, 16; New London, 15.3; North Grosvenor Dale, Storrs, and West Simsbury, 14; Middletown, 13.5; Canton, 13; Norwalk (b) and Southington, 12.5; Hartford (b), 12; New Hartford (b) and Voluntown, 10.

*Delaware*.—Seaford, 17; Millsboro, 12.7; Dover, 12.1. *District of Columbia*.—Washington, 11.3. *Georgia*.—Dahlonega, 18; Athens (a), 16; Toccoa, 13.5; Rome, 12.5; Diamond, 11.4; Adairsville and Gillsville, 11; Canton, Elberton, and Lafayette, 10. *Idaho*.—Ruthburg, 21; Garden Valley, 20; Martin, 19; Kootenai, 12; American Falls, 10. *Illinois*.—Ottawa and Rockford, 24.5; Oswego, 17.6; Fort Sheridan, 17.2; Winnebago, 17; Dixon and Lagrange, 15.5; Chicago, 15.2; Aurora (b), 14.6; Hennepin, 14.5; Watseka, 14; Aurora (a), 12.5; Sycamore, 11.7; Palestine, 11.2; Riley, 11.1; McLeansboro and Walnut, 11; Martinsville, 10.8; Rantoul, 10.7; Kankakee, 10.

*Indiana*.—Michigan City, 45.5; Columbia City, 29.3; Shelbyville, 26; Hawpatch, 25.5; Butlerville, 25.3; Angola, 23.7; Logansport (b), 23.2; Marion, 23; Hammond and Mauzy, 21; Farmland, 20.8; Point Isabel, 20.5; Vevay, 20.4; Franklin, 20; Kokomo, 17.7; Muncie, 17.5; Cambridge City and Lafayette, 17.2; Connersville, 15.5; Ashboro and Irvington, 15; Indianapolis, 14.3; Columbus, 14.2; Veedersburg, 13.5; Crawfordsville, 13; Rockville, 12.7; Worthington, 11.6; Jeffersonville, 11.2; Princeton and Union City, 10. *Indian Territory*.—Lehigh, 12. *Iowa*.—Hawkeye, 34.2; Havelock, 34; Blakeville, 22; Dubuque, 18; Clinton, 15.3; Charles City, 15; Fulton, 14.5; Mechanicsville, 14.3; Independence, 14.2; Cedar Falls, Grand Meadow, and Tipton, 14; Fayette, 12.2; Estherville and Hopkinton, 12; Denison, 11.5; Delaware, 10.4; Cresco and Vinton, 10. *Kansas*.—Columbus and Oswego, 3.

*Kentucky*.—Versailles, 22.9; Hendricks, 22.5; South Fork, 18; Shelby City, 15.8; Carrollton, 14; Caddo, 12.5; Shelbyville, 12.2; Catlettsburg, 12; Harrodsburg, 11.9; Lexington, 11.3. *Louisiana*.—Plain Dealing, 4. *Maine*.—Calais, 20; Farmington, 19.2; Indian Stream, 18; Kents Hill, 15.6; Lewiston, 15.2; Cornish, 15; Bar Harbor, 14; Houlton, 13.2; East Machias, 12; Portland, 11.9; Kennebec Arsenal, 11; Fairfield, 10. *Maryland*.—Oakland, 36; Sunnyside, 31.5; Boettcherville, 19.5; Cambridge, 14.2; Denton, 13.2; Jewell and Salisbury, 12; Woodstock, 11.7; New Market, 11.5; Barren Creek Springs and Fenby, 11.2; Glyndon, 10.

*Massachusetts*.—Monroe, 25; Beverly Farms, 24; Salem, 23; North Billerica, 22; Concord (a) and Somerset, 21.5; Florida Mountain, 20.5; Taunton (a), 20; Mansfield, 19; Wayland, 18.5; Woods Holl, 18.3; Framingham, Gilbertville, Roberts Dam, Taunton (d), and Vineyard Haven, 18; Taunton (b), 17.8; Ashland, Fall River, and Monson, 17; Williamstown, 16.2; Ludlow Center and Wakefield, 16; Roxbury, 15.9; Hyannis 15.5; Andover, 15.4; Westboro, 15.2; Leicester, 15.1; Blue Hill, Lawrence, Milton, Randolph, and Webster, 15; Springfield Armory, 14.8; Boston, 14.6; Chestnut Hill, 14.5; Amherst (a), 14.2; Middleboro, 14; Provincetown, 13.8; Nantucket, 13.2; Hingham and New Bedford (a), 13; Amherst and Fiskdale, 12.5; Fitchburg (a and b), Groton (a), Mount Nonotuck, and New Bedford (b), 12; Mystic Lake, 11.5; South Dennis and Worcester (b), 11; Cambridge (a) and Plymouth, 10.

*Michigan*.—Benton Harbor, 49.5; Bear Lake, 47.6; Berrien Springs (b), 42; Ivan, 41.5; Boon, 40.6; Berrien Springs (a), 39.1; Charlevoix, 37.5; Hart, 37; Grand Haven, 36.5; Caldwell, 36; Harrisville, 35.1; Vandalia, 34.8; Bellaire, 34.6; Brown City, 33.2; Harbor Springs and Thornville, 32; Gaylord, 31.9; McMillan, 31; Berlin, 30; Saint Ignace, 29; Grayling, 27.5; Glenwood, 27.3; Ann Arbor, 27.1; Jeddo, 26.5; Washington, 26; Harrison, 25.7; Highland Station, 25.4; Manistee, 25.2; Allegan, 24.8; Calumet, 24.5; Fitchburg and Mottville, 23.8; Detroit and Ypsilanti, 23.1; Mayville and Noble, 23; Marquette, 22.7; Birch Run and Escanaba, 22; Alma and Lake City, 21; Port Huron, 20.7; Evart, 20.6; Howell, 20.5; Hastings, 20.2; Marshall, 20; Alpena, 19.7; Birmingham, Hayes, and Rawsonville, 19; Arabela, Hanover, Olivet, and Ovid, 18; Lansing, 17.9; Flint, 17.6; Bronson, 17; Fairview, 16.4; Grape, Hillsdale, Kalamazoo, and Parkville, 16; Madison, 15.9; Ball Mountain, 15.7; Cheboygan, 14.8; Clinton and Sault Ste. Marie, 14.2; Adrian, 12.9; Williamston, 12.5; Paris, 12.2; North Marshall and Sand Beach, 12.

*Minnesota*.—Sandy Lake Dam, 37.2; Pine River, 24; Maple Plain, 20.3; Saint Oloff, 20.2; Northfield, 19.8; Moorhead, 18.4; Leech Lake, 17.1; Kinbrae and Pokegama Falls, 17; Farmington, 16; Montevideo, 14.8; Alexandria (b), 14.5; Lake Winnibigoshish, 14.2; Winona, 13.5; Collegeville, 13.4; Sheldon, 13.2; Cambridge and Saint Charles, 12.5; Alma City, 12.4; Minnesota City, 12; Minneapolis, 11.4; Grand Meadow, 11.2; Easton, 11; Bird Island, 10.8; Duluth, 10.6; Saint Paul, 10.2. *Mississippi*.—Booneville and Water Valley, 14; Pontotoc, 12; University, 11; Clarksdale, Corinth, and Okolona, 10. *Missouri*.—Miami, 7.2. *Montana*.—Martinsdale, 26; Fort Missoula, 19.5; Fort Logan, 18; Helena, 17.2; Cokedale, 17; Boulder and Choteau, 15; Hogan, 13; Havre, 12.6; Camp Poplar River, 12.1; Elk Park, 12; Deer Lodge City, 11.6.

*Nebraska*.—Plattsmouth, 6.5. *Nevada*.—Palmetto, 30; Stoeffel, 27; McDermitt, 25.5; South Camp, 23.5; Elko, 22; Winnemucca, 19.2; Virginia City, 19.1; Halleck, 19; Palisade, 18; Carlin, 17; Cranes Ranch, 16; Elko (near), Fenelon, Verdi, and Wells, 15; Tecoma, 14.5; Humboldt, 13.5; Toano, 12.7; Mill City, 12; Lewer Ranch, 11; Ely, 10. *New Hampshire*.—North Conway, 19; Plymouth, 18; East Canterbury, 17.2; Berlin Mills, 16; Sanbornton, 13.5; Grafton, 13; Dublin, 12.5; Concord (a), Keene, and Peterboro, 12; Walpole, 11.8; Manchester, 11.4; Nashua, 11; Brookline and Newton, 10.5.

*New Jersey*.—Cape May, 29.6; Toms Rivers, 29.5; South Orange, 28.5; Barnegat, 27.5; Oceanic and River Vale, 24; Bayonne, 22.4; Junction, 22.3; Franklinville, 22.2; Asbury Park, 22; Lambertville, 21.5; Rancocas, 21.2; Bridgeton, Moorestown, and Paterson, 21; Billingsport L. H., 20.5; Newark (b), 20.4; Beverly, 19.9; Blairstown and Dover, 19.5; Butler, 19.1; Newark (a) and Trenton, 19; Tenafly, 18.5; Egg Harbor City and Plainfield, 18.1; Newton, 18; Woodbine, 17.6; Highland Park, New Brunswick, and Salem, 17.5; Gillette and Whiting, 17; Hightstown, 16.7; Locktown, 16.5; Friesburg, 16.1; Pensauken, 15.5; Atlantic City, 15.1; Ocean City, 15; Imlaystown, 14; Penns Grove, 11; Hammonton, 10.7; Belvidere, 10. *New Mexico*.—Chama, 18.8.

*New York*.—Oswego, 41.8; Eden Center, 37; Le Roy, 30.5; Alfred Center, 28; Turin, 27.2; Utica, 23.2; Number Four, 22.7; Middletown, 20.5; New York, 20.3; Palermo, 20.2; Oxford, 19.7; Glens Falls, Humphrey, and Madison Barracks, 19.5; South Canisteo, 19.4; Boyds Corner, 19.2; Albion, 19; Angelica, 18.5; Port Jervis, 17.5; Lockport and Setauket, 17; Carmel, 16.8; Factoryville, 16.6; Baldwinsville, 16.5; Honeymead Brook, 16.4; Rochester, 15.9; North Hammond, 15.7; Rondout, 15.5; New Lisbon and Wedgwood, 14.8; Binghamton, 14.7; Groversville, 14.6; Arcade, 14.4; Buffalo, 14.1;

Brookfield, Constableville, Potsdam, and Willets Point, 14; West Point, 13.8; Canton, 13.4; Malone, 13.3; Ogdensburg and Victor, 13; Axton, 12.8; Perry City, 12.2; Addison, 11.3; Geneva and Plattsburg Barracks, 11; Ithaca, 10.7; Lebanon Springs, 10.5; Lowville, 10.

*North Carolina*.—Littleton, 24; Bryson City, 23; Southern Pines, 22.5; Bakersville, 21.5; Louisburg, 20.2; Experimental Farm (near Raleigh), 20.1; Pittsboro and Raleigh, 20; Murphy, 19; Horse Cove, 18.5; May, 18; Chapel Hill, Highlands, Lillington, and Soapstone Mount, 17.5; Asheville and Saxon, 16.5; Weldon, 15.8; Currituck Inlet, 15.1; Roxboro, 14.2; Willeyton, 14; Smithfield, 13.6; Bailey, Charlotte, Marion, and Mount Pleasant, 13.5; Douglas, 13.3; Mount Airy, 11.2; Lewiston, 11; Flat Rock and Salisbury, 10.5; Mount Holly, 10. *North Dakota*.—Fort Buford, 23.5; Medora, 21.5; Grafton, 17.5; Ellendale, 17.2; Grand Forks, 17; Saint Johns, 15.7; Lakota, 13.7; Churchs Ferry, 13; Mayville and Milton, 10.

*Ohio*.—Wheeler, 65; Weymouth, 36; Bissells, 31.7; Sandusky, 29.8; Garrettsville, 26.3; Strongsville, 26; Ashland, 25.5; North Lewisburg, 25; Wauseon, 24.5; Ridgeville Corners, 23.6; Jacksonboro, 23; Caledonia, 22.8; Colebrook and Orangeville, 22.5; Hillhouse, 22.3; Benton Ridge, 21.7; Auburn, 21.4; Campbellstown, 21; Ellsworth, 20.7; Levering, 20.2; Hackney and McLuney, 19; Mansfield, 18.7; Bement, Cambridge, Elyria, Hedges, and Van Wert, 18; Cherry Fork, 17.5; Tiffin, 17.2; Canton and Kenton, 17; Milfordton, 16.5; Cincinnati, 16.3; New Berlin, 16.2; Rittman, 16.1; Bellevue and Lordstown, 16; Wooster (b), 15.6; Green Hill, 15.4; Frankfort, Mountville, Portsmouth (a), and Sidney, 15; Columbus, 14.7; Sharon Center, 14.6; Carrollton, 14.5; Gratiot, 14.3; Pataskala, 14.1; Tyrone, 14; Cardington, 13.8; Coalton, 13.1; Cleveland, 12.8; Demos, 12.7; Big Prairie, 12.5; Greenfield, 12.2; Hillsboro and Plattsburg, 12.1; Bethany, Camp Dennison, and Clarksville, 12; Walnut, 11.3; Leipsic, 11.2; Chicago, 11; Toledo, 10.9; Annapolis, 10.6; Lowell, 10.5; Royalton, 10.4.

*Oklahoma*.—Anadarko, 7. *Oregon*.—Siskiyou, 26; Forest Grove, 22; Albany (b), East Portland, and Lafayette, 19; Leeland, 18; McMinnville (a), 17.9; Sheridan, 17.5; Corvallis (a), 17; Junction City, 16; Eugene, 15.9; Beulah, Hood River (near), McMinnville (b), and Silver Lake, 15; Albany (a), 14.5; Albany (c), Comstock, and Springfield, 14; Newberg, 13.5; Burns, 13.4; Aurora, Corvallis (b), and Monmouth, 13; Lone Rock, Salem (a), and Williams, 12; Portland, 11.8; The Dalles, 11; Astoria, 10.8; Silverton, 10.2; Mount Angel, 10.

*Pennsylvania*.—Blue Knob, 40.5; Grampian, 39; Saegertown, 33.8; Du Bois, 33.5; Corry, 32; Salem Corners, 29.7; Quakertown, 27.5; Newcastle, 27; Coopersburg, 26.5; Stoyestown, 25; Easton, 23.6; East Mauch Chunk, 23.5; Phoenixville, 23.4; Blooming Grove, Johnstown, and Oil City, 22; Girardville, 21.5; Philadelphia, 20; Erie, 19.8; Drifton, 19.7; Dyberry, Emporium and Uniontown, 19.5; Wellsboro, 19.2; Freeport, Honesdale, West Newton, and Wysox, 18; Coatesville, 17.7; Pottstown, 17.5; South Eaton, 17; Wilkesbarre, 16.6; Lock Haven, 16.5; West Chester, 15.8; Pittsburg, 15.2; Lock No. 4, 15; Gettysburg, 14.5; Greensboro, Parker, Swarthmore, and Warren, 14; Bennett Square and Saltsburg, 13; Lancaster, 12.5; Le Roy, 12.3; State College, 11.5; Huntingdon, 11.3; Ridgway, 11.2; Lebanon, 10.7; Hollidaysburg, 10.

*Rhode Island*.—Kingston (b), 19; Providence (a), 18; Lonsdale, 17.5; Bristol, 15.5; Kingston (a) and Providence (c), 14.5; Olneyville and Pawtucket, 14; Providence (b), 13; Narragansett Pier, 12. *South Carolina*.—Cheraw (a), 14; Greenville, 12.9; Yorkville, 10.5; Anderson, 10. *South Dakota*.—Britton and Frankfort, 10.5; Rosebud, 10. *Tennessee*.—Rogersville (a), 26; Tazewell, 25.3; Springdale, 21; Greeneville, 19.1; Newport, 19; Rogersville (b), 17.1; Chattanooga, 15.8; Kingston and Rugby, 12.5; London, 12; Lookout Mountain, 11.6;

Clinton, 11. *Texas*.—Arthur City, 6.5. *Utah*.—Scofield, 18.2; Castle Gate, 15.8; Grouse Creek, 14.1; Richfield, 14; Heber, Lake Park, and Promontory, 13; Levan, 12.8; Blue Creek, 12.5; Kelton and Terrace, 12.

*Vermont*.—Jacksonville, 23.2; Chelsea, 18; Brattleboro, 16; Irasburg, 15.5; Strafford, 15; Woodstock, 14; Vernon, 13.5; Hyde Park, 13.2; Northfield and Hartland, 12.7; Norwich and Saxtons River, 12; Wells, 11; Simonsville, 10. *Virginia*.—Marion, 30; Abingdon, 27; Emporia, 24; Richmond (a), 21.5; Spottsville, 21; Big Stone Gap and Wytheville, 20; Ashland and Cape Henry, 17; Birdsnest, 15.4; Norfolk, 13.7; Petersburg, 13.5; Clarksville, 13; Danville and Warsaw, 12.5; Bedford City and Staunton, 12; Hot Springs, 11.5; Nottoway, 10.

*Washington*.—Port Angeles, 33.2; Port Crescent, 32.4; Vashon, 28.5; Aberdeen, 26; Madrone, Pine Hill, and Tacoma, 20; Silver Creek, 19; Fort Spokane, 18.1; Seattle, 15; Chehalis, 14; Centralia, 13.9; Olympia, 13.7; Fort Townsend, 13.2; Fort Canby, 11.6; Colfax, 11.5; Fort Simcoe and Waterville, 10. *West Virginia*.—Kingwood, 30; Rowlesburg, 27; Grafton, 25.2; Nuttallburg, 24; Parkersburg, 23.6; Charleston (a) and Glenville, 23; Buckhannon (a), 22.1; Elkhorn, 22; Davis and New Martinsville, 21; Bluefield, 20; Spencer, 19; Morgantown (b), 18.6; Philippi, 18; Point Pleasant, 17.8; Fairmont, Morgantown (a), and Wheeling (a), 17; Tannery, 15.5; Central Station and Wheeling (b), 15; Ella and Huntington, 14.

*Wisconsin*.—Columbus, 28; Depere, 25.8; Prairie du Chien, 22; Koepenick and Oshkosh, 21; Rhinelander, 20; Lancaster, 19.7; New Holstein, 19.6; Chippewa Falls, 19; Weston, 18.5; Fond du Lac and Hudson, 18; Amherst and Green Bay, 17.5; Crandon, 17.4; Manitowoc, 17.3; Grantsburg, 17.2; Beloit, Hammond, Hillsboro, and Osceola, 17; Westfield, 16.8; Oconomowoc and Raymond, 16.5; Oconto, 16.4; Valley Junction, 15.8; Waukesha, 15.6; Baraboo, 15.5; Watertown, 15.2; Sparta (b), 15; Madison, 14.8; La Crosse, 14.6; Menomonie, 14.3; Meadow Valley and Portage, 14; Black River Falls and Harvey, 13.8; Sharon, 13.5; Reedsburg, 13.4; Beaver Dam and Shawano, 13.2; Eau Claire (a), 13.1; Bayfield, 12.6; Appleton and Barron, 12.5; Cadiz, 12.4; Janesville, 12.2; Pepin, 11.8; Mineral Point and Shell Lake, 11; Milwaukee, 10.7; Delavan and Viroqua, 10. *Wyoming*.—Fort Yellowstone, 18.4; Evanston, 13.

#### SLEET.

Description of the more severe sleetstorms is given under "Local storms." Sleet was reported as follows: 1st, Connecticut, Illinois, Kansas, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Hampshire, New Jersey, New

York, North Dakota, Ohio, Pennsylvania, Vermont, and Virginia. 2d, Illinois, Maryland, Pennsylvania, Tennessee, and Vermont. 3d, North Carolina and Tennessee. 4th, Montana, North Dakota, and South Dakota. 5th, Nebraska. 6th, Kansas, Missouri, Nebraska, and South Dakota. 7th, Alabama, Illinois, Kentucky, Nebraska, and South Dakota. 8th, Alabama and Kentucky. 9th, Alabama, Illinois, Indiana, and Missouri.

10th, Kansas, Kentucky, Missouri, New Jersey, and Washington. 11th, Georgia, Illinois, Kentucky, Mississippi, North Carolina, and Tennessee. 12th, Georgia, Illinois, Kansas, Kentucky, Massachusetts, Missouri, North Carolina, South Carolina, and Tennessee. 13th, Georgia. 14th, Alabama, Georgia, Louisiana, Mississippi, Missouri, and Tennessee. 15th, Georgia, Nevada, Oregon, and Virginia. 16th, Nevada and Oklahoma. 17th, Florida, Georgia, Illinois, Louisiana, Michigan, Mississippi, South Dakota, and Texas. 18th, Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, and Texas.

19th, Alabama, Florida, Georgia, Louisiana, Mississippi, Missouri, South Carolina, and Texas. 20th, Michigan, Missouri, North Dakota, and South Carolina. 21st, Michigan, Missouri, and Oregon. 22d, Illinois, Michigan, Missouri, Washington, and Wisconsin. 23d, Iowa. 24th, Illinois, Indiana, Michigan, Oregon, Virginia, and West Virginia. 25th, Illinois, Kansas, Michigan, Missouri, Nebraska, Oregon, Pennsylvania, and Washington. 26th, Illinois, Indiana, Indian Territory, Kansas, Missouri, Nebraska, Oklahoma, and Oregon. 27th, California, Illinois, Indiana, Indian Territory, Iowa, Kansas, Michigan, Missouri, Nevada, New Jersey, New York, Ohio, Oklahoma, Oregon, Pennsylvania, and Wisconsin.

28th, California, Connecticut, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, Ohio, Oregon, and Wisconsin. 29th, Arkansas, Connecticut, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Vermont, Washington, and Wisconsin. 30th, California, Colorado, Illinois, Indiana, Iowa, Kansas, Maryland, Michigan, Missouri, Nevada, New Jersey, Ohio, Oregon, and West Virginia. 31st, Colorado, District of Columbia, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, New Jersey, New York, Ohio, South Dakota, Utah, Washington, and Wisconsin.

#### HAIL.

Hail was reported on the 10th in Oregon; on the 12th in Alabama and North Carolina; on the 27th in California; and on the 28th in Kansas.

#### WINDS.

The prevailing winds in January, 1893, are shown on Chart II by arrows flying with the wind. In New England and the upper Mississippi valley, and on the middle-eastern slope of the Rocky Mountains, the winds were generally from west to north; in the middle Atlantic states, and on the south Pacific coast, from the northwest; in the south Atlantic and east Gulf states, the Ohio Valley and Tennessee, the Lake region, and on the northeast slope of the Rocky Mountains, from southwest to northwest; over the Florida Peninsula, from northwest to north; over the middle plateau region, from northeast to southeast; over the northern plateau region, from southeast to south; along the north Pacific coast, from east to south; along the middle Pacific coast, from the southeast; and in the west Gulf states, on the southeast slope of the Rocky Mountains, and over the southern plateau, variable.

#### HIGH WINDS (in miles per hour).

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows: 1st, 80, nw., at Pikes Peak, Colo.; 50, se., at New London, Conn.; 50, s., at Kittyhawk, N. C. 2d, 60, se., at Woods Holl, Mass.; 52, s., at Boston, Mass. 3d, 52, sw., at Havre, Mont.; 50, sw., at Amarillo, Tex. 5th, 60, ne., at Block Island, R. I. 6th, 70, ne., at Block Island, R. I.; 68, e., at Tatoosh Island, Wash.; 54, nw., at Kearney, Nebr. 7th, 57, e., at Tatoosh Island, Wash. 10th, 98, w., at Pikes Peak, Colo.; 51, nw., at Woods Holl, Mass. 11th, 54, nw., at Kearney, Nebr.; 52, n., at Bismarck, N. Dak.; 50, nw., at Dodge City, Kans. 13th, 96, w., at Pikes Peak, Colo.; 51, nw., at Colorado Springs, Colo.; 50, w., at Cheyenne, Wyo. 14th, 72, e., at Tatoosh Island, Wash.; 68, se., at Fort Canby, Wash. 15th, 76, e., at Tatoosh Island, Wash.; 66, se., at Fort Canby, Wash. 19th,

52, ne., at Kittyhawk, N. C. 25th, 60, e., at Tatoosh Island, Wash. 26th, 80, w., at Pikes Peak, Colo.; 72, se., at Tatoosh Island, Wash. 27th, 96, w., at Pikes Peak, Colo.; 54, w., at Cheyenne, Wyo.; 54, sw., at Winnemucca, Nev.; 52, sw., at Amarillo, Tex. 28th, 56, e., at Tatoosh Island, Wash.; 50, sw., at Amarillo, Tex. 29th, 84, sw., at Pikes Peak, Colo.; 59, sw., at Buffalo, N. Y. 30th, 58, nw., at Tatoosh Island, Wash.; 57, sw., at Colorado Springs, Colo.; 54, w., at Fort Canby, Wash. 31st, 60, w., at Huron, S. Dak.; 60, sw., at Idaho Falls, Idaho; 58, sw., at Colorado Springs, Colo.; 56, sw., at Amarillo, Tex.; 55, e., at Tatoosh Island, Wash.; 52, nw., at Moorhead, Minn.

## LOCAL STORMS.

**1st-2d.**—At New London, Conn., light rain, with a southeast gale reaching a velocity of 50 miles per hour, prevailed during the 1st. At Southington, Conn., snow began 8 a. m., 1st, and changed to rain 1 p. m., with a heavy southeast gale at night; roads were badly washed and river meadows were flooded. At Blue Hill Observatory, Mass., the gale was reported the severest on record. At Billerica, Mass., a heavy southeast gale, with snow, sleet, and rain, prevailed. On the 2d the wind reached a velocity of 60 miles per hour from the southeast at Woods Holl, Mass., and a velocity of 52 miles per hour from the south was recorded at Boston, Mass. High wind caused damage of a minor character at Portland, Me.

**5th.**—In the evening high wind caused some damage at Chattanooga, Tenn. High northwest winds prevailed over Lake Michigan.

**5-6th.**—Northeast gales prevailed along the middle Atlantic and New England coasts, causing considerable damage to seaside property on Long Island and in New Jersey. On the southeast New England coast wind velocities of 60 to 70 miles per hour were reported. High northwest winds continued off the south New England, Long Island, and New Jersey coasts until the morning of the 7th.

**8-9th.**—High winds set in over the upper lakes. At Grand Haven, Mich., the wind caused an accumulation of ice which extended several miles from the shore. A northwest gale prevailed over Lake Erie during the 9th.

**10-11th.**—High northwest winds prevailed over the middle Atlantic and south New England states.

**14-15th.**—At Fort Canby, Wash., the wind increased in squalls from the southeast, and at 11.20 p. m., 14th, reached an extreme velocity of 110 miles. The gale continued until about noon of the 15th, and reached an extreme velocity of 120 miles per hour at 2.20 a. m., 15th. Several houses were blown down, trees were uprooted and broken off, and telegraph lines were prostrated. At Tatoosh Island, Wash., the maximum wind velocity was 72 miles on the 14th, and 76 miles per hour from the east on the 15th.

**17th.**—A destructive windstorm was reported at Highlands, about 50 miles east of Los Angeles, California.

**19th.**—At Jupiter, Fla., a thunderstorm prevailed from 1 to 3.04 p. m.; the wind reached a velocity of 33 miles per hour from the south, causing boats to drag their anchors.

**24th.**—At Key West, Fla., the barometer fell in the morning. From 1.30 to 2 p. m. the wind was variable. At 2 p. m. the wind began to increase from the north, and reached a velocity of 48 miles per hour at 3.05 p. m. From 2 to 3 p. m. the gale was attended by heavy rain and thunder at intervals.

**30th.**—At Heber, Utah, a thunderstorm prevailed from 10 p. m. until midnight. At 11 p. m. a violent storm from the southwest moved northeast over the town, leveling buildings, etc., in a path about 30 rods in width. On the 30th-31st a southwest gale damaged buildings at Montrose, Colo.

**31st.**—A northwest gale, with heavy snow and very low temperature, prevailed at Fort Buford, N. Dak. Westerly gales prevailed generally along the eastern Rocky Mountain slope and in the Northwest.

## INLAND NAVIGATION.

## ICE IN RIVERS AND HARBORS AND CLOSING OF NAVIGATION.

At Portland, Me., ice formed in the lower bay on the 14th for the first time since 1884; 19th, ice partly broken by warmer weather; navigation not interrupted. Great floes of ice interfered with navigation in Boston harbor from the 11th to the 13th. At Vineyard Haven, Mass., the harbor was frozen on the 12th; 17th, steamer "Monohansett" failed to get out of Edgartown harbor on account of ice; revenue cutter "Dexter" also ice bound; 20th, steamer "Nantucket" came through ice; 27th, steamer "Edgartown" broke through the ice. At New London, Conn., the Connecticut River was frozen over on the 11th; on the 16th navigation between New London and Norwich was closed. Ice in the rivers and harbor at New York interfered with navigation at intervals during the month. At Baltimore, Md., navigation, except for large steamers, was seriously interfered with by ice from the 17th to the 22d. On the latter-named date ice boats cut a channel for five delayed ocean steamers, and the ice blockade in Baltimore harbor was practically broken. On the 16th a large field of ice was encountered off Absecon, N. J. On the 17th field ice was reported about Barnegat, N. J., and heavy ice was encountered about the Delaware Breakwater and in the Delaware River. Heavy ice was reported in Delaware Bay until the last of the month. On the 22d Chesapeake Bay and tributaries were full of broken ice, and large quantities of ice were encountered off the New Jersey coast. A report from Norfolk, Va., dated the 24th, stated that navigation in that vicinity had been stopped for two weeks, large steamers, only, being able to cut their way through.

At New Brunswick, N. J., ice in the Raritan River broke the early morning of the 2d, and carried away a temporary bridge at the foot of Albany street; 20th, ice in the Raritan River 14 inches in thickness; ice broke in Raritan Bay and the lower Raritan River. At Penns Grove, N. J., the Delaware River was closed during the month, except the west channel which was kept open by iceboats. Heavy ice interfered with navigation at Philadelphia, Pa., on the 12th.

At Washington, D. C., navigation on the Potomac River was closed by ice from the 16th to the 28th. During the cold spell which began December 20, 1892, and continued with little interruption until about January 23, 1893, the mean temperature was  $21.2^{\circ}$ , and ice formed on the Potomac River to a thickness of 13.5 inches at a point in mid-stream about one-half mile above the Aqueduct bridge.

At Clarksville, Va., the Roanoke River was frozen from the 8th to the 26th; 27th to 31st, running ice at Clarksville. At Richmond, Va., the James River was frozen from the 7th to the 26th. A report from Kittyhawk, N. C., stated that Albemarle Sound and Bay were frozen over from the 3d to the 28th, suspending navigation. On the 18th and 19th traffic at Hatteras, N. C., was suspended on account of heavy ice. At Tarboro, N. C., the Tar River was frozen over on the 19th; from the 20th to the 23d persons were crossing on the ice. At Fayetteville, N. C., navigation on the Cape Fear River was stopped by ice on the 16th; 19th, river frozen over; 27th, ice broke up. The Peegee River was frozen over at Cheraw, S. C., from the 14th to the 26th. Floating ice was reported in the Santee River at Saint Stephens, S. C., on the 21st and

22d. At Resaca, Ga., floating ice was reported in the Oostanaula River from the 11th to 13th; 14th to 24th, river frozen over; 26th and 27th, floating ice. At Rome, Ga., the Oostanaula River was frozen on the 16th for the first time since January, 1857; 23d, ice 4 inches in thickness, and persons crossing; 25th, ice broke up. The Chattahoochee River was frozen over at Whitesburg, Ga., from the 19th to the 21st. At Cordova, Ala., floating ice was reported in the Big Warrior River on the 16th; 17th, river partly frozen. The Coosa River was frozen at Wilsonville, Ala., on the 20th.

Floating ice was reported in the Tennessee River at Florence, Ala., from the 11th to the 19th. At Charleston, W. Va., floating ice was reported in the Kanawha River on the 1st; 7th, river closed; 10th and 25th, boats broke through the ice. The Alleghany River closed at Freeport, Pa., on the 7th; 29th, ice running. On the 17th the south end of Seneca Lake, N. Y., was frozen over for the first time since 1885.

*Monongahela River.*—At Morgantown, W. Va., ice passed out on the 29th. Ice passed out at Fairmont on the 27th. At Lock No. 4, Pa., the river was frozen on the 1st; 3d and 4th, floating ice; 5th, river clear; 6th, frozen, but opened at 6 p. m.; 27th to 31st, floating ice. At Greensboro ice passed out on the 2d; 5th, river frozen; 29th, ice passed out.

*Ohio River.*—At Pittsburg, Pa., the river was frozen from the 11th to the 25th. At Parkersburg, W. Va., the river was frozen on the 1st; 2d, ice in Little Kanawha River broke and ran out; 5th, ice gorge above Baltimore and Ohio Railroad bridge broke at 5.30 p. m. and ran out; 6-7th, river frozen; 8th, ice running; 11th to 24th, river frozen; 29th, ice started to run, and on 31st was running out rapidly, with a rapid rise in the Ohio and Little Kanawha rivers. At Wheeling, W. Va., the river closed the night of the 10th; 29th, ice broke and gorged; 30th, gorge gave way. At New Cumberland, W. Va., the ice broke on the 3d; 11th, river closed; 30th, ice passed out. At Portsmouth, Ohio, the ice gorge broke the night of the 1st; 2d to 12th, heavy ice running; 13th to 29th, river closed; 29th, ice broke without causing material damage; 30th and 31st, heavy ice running.

At Cincinnati, Ohio, ice stopped running and the river was frozen on the 6th; 8th, ice gorge broke at 2 p. m.; the river was filled with a mass of grinding, crushing ice 4 to 10 feet in thickness, which caused great destruction to river property; 10th, river free of ice in front of the city, but a new gorge forming at the mouth of the Little Miami River; 14-15th, river frozen; 21st, river gorged at several points; 29th, ice broke at 7 a. m. At Shawneetown, Ohio, the river was frozen from the 13th to 26th, and opened on the 28th. At Maysville, Ky., the river gorged on the 10th and remained closed until the 29th; teams crossed on the ice. At Louisville, Ky., navigation was nearly suspended on account of heavy ice from the 1st to the 6th; 7th, river full of floating ice; 8-9th, river above the city gorged with ice; 10th, gorge above city broke and caused considerable damage to a coal fleet anchored at Louisville; 26th, ice allowed passage of ferryboats. On the 29th the ice passed out at Madison, Ind. At Paducah, Ky., floating ice was reported from the 4th to the 27th. At Mount Vernon, Ind., the river was closed on the 15th; 29th, ice broke.

Ice in the Sciota River at Circleville, Ohio, broke up on the 30th and passed out on the 31st. At Louisa, Ky., navigation on the Big Sandy River closed on the 1st; 3d, ice broke up; 5th, navigation closed; 30th, ice broke; 31st, navigation resumed.

*Cumberland River.*—At Nashville, Tenn., thin ice covered the river on the 13th for the first time since 1877; 16th, ice 2 to 3 inches in thickness covered the river; 24th, ice melting; 26th, river nearly clear of ice; 27th, river free of ice. On the 14th the river was full of slowly moving ice at Clarksville, Tenn. At Eddyville, Ky., the river was full of floating ice on the 13th and 14th.

*Tennessee River.*—On the 16th the river was frozen over opposite the southern part of Knoxville, Tenn., and a gorge formed below the Knoxville and Augusta Railroad bridge. At Chattanooga, Tenn., the river was partly frozen on the 11th; 13th and 14th, river full of ice; 16th, river almost frozen over; 17th-22d, river frozen; 23d-31st, running ice. The river was frozen over at Paducah, Ky., on the 16th.

*Mississippi River.*—At Saint Louis, Mo., the river was open on the 1st, and again closed on the 21st. At Cairo, Ill., the river was frozen from shore to shore on the 10th, and the Ohio River was full of floating ice; 14th, heavy ice ran out of the Ohio River. Heavy floating ice was reported at Memphis, Tenn., from the 12th to the 19th. At Helena, Ark., ice was reported in the river on the 15th; 23d, river clear of ice.

On the 22d the ice in the bay at Erie, Pa., was 17 to 18 inches in thickness. At Detroit, Mich., the river was frozen over and persons were crossing on the ice on the 10th. On the 23d persons and teams crossed on the ice from the mainland to many of the islands of the northwest part of Lake Erie for the first time in many years. A report from Saint Ignace, Mich., dated the 11th stated that an ice bridge had formed to Mackinac Island. At Grand Haven, Mich., the harbor was blocked by ice on the 17th, and two Milwaukee steamers were fast in the ice outside the harbor; 20th, one of the steamers, with the assistance of a tug, arrived at her dock; 21st, harbor again closed by ice; 26th, the other steamer entered the harbor with the assistance of a tug; 27th, a steamer left for Milwaukee, easterly winds having forced the ice out of the harbor; 31st, harbor open.

At Miles City, Mont., ice in the Yellowstone River broke up on the 6th. At The Dalles, Oregon, ice was reported in the Columbia River from the 1st to 3d, and 16th to 31st.

#### STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, January, 1893.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>						
Shreveport, La.	29.9	29.1		1	16.5	31
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	8.6		4	2.7	22
Little Rock, Ark.	23.0	15.4		3.4	6.7	23, 24
<i>Missouri River.</i>						
Port Buford, N. Dak.						
Pierre, S. Dak.	14.0					
Sioux City, Iowa	18.7					
Kansas City, Mo.	21.0					
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0					
La Crosse, Wis.	11.8					
Dubuque, Iowa	16.0					
Davenport, Iowa	15.0					
Keokuk, Iowa	14.0					
Hannibal, Mo.	17.0					
Saint Louis, Mo.	30.0	7.5		16	2.8	7
Cairo, Ill.	40.0	16.8		4	5.2	28
Memphis, Tenn.	33.0	12.3		7	1.8	24
Vicksburg, Miss.	41.0	22.4		1	6.3	11
New Orleans, La.	13.0	8.1		14-16	4.0	31
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0					
Cincinnati, Ohio	45.0	26.5		31	6.1	1
Louisville, Ky.	24.0					
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	11.4		6	3.3	27
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	7.1		31	2.9	12, 13, 23
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	14.7		30	1.4	1
<i>Savannah River.</i>						
Augusta, Ga.	32.0	13.0		31	6.4	18, 19
<i>Willamette River.</i>						
Portland, Oregon	15.0	8.6		1	1.4	30
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	2.8		3-5	2.0	17-28
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	9.0		31	3.2	12
<i>James River.</i>						
Lynchburg, Va.						

Heights of rivers—Continued.								
Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.		
		Height.	Date.	Height.	Date.			
Sacramento River.	Feet.	Feet.		Feet.				
Red Bluff, Cal.	11.9	27		3.5	23, 24	8.4		
Sacramento, Cal.	26.0	1		19.5	26	6.5		

\* River frozen. † For 19 days. ‡ For 27 days. § For 22 days. || For 17 days.

## CLOSING AND OPENING OF NAVIGATION AT ALBANY, N. Y., 1832 TO 1892.

Chart IX, published with this issue of the REVIEW, presents diagrams, prepared by Mr. A. F. Sims, Observer, Weather Bureau, Albany, N. Y., showing the dates of closing and opening of navigation in the Hudson River at Albany, N. Y., the number of days in each winter, and the average number of days by decades of years, and for the period 1832 to 1892, navigation was closed by ice.

## ATMOSPHERIC ELECTRICITY.

## AURORAS.

Auroras were reported as follows: 1st, Des Moines, Iowa. 5th, Minnesota City, Minn.; Newark, N. J. 6th, Cornish, Me.; Manchester, N. H.; Concord, Mass.; Sandy Lake Dam, Minn. 8th, Surface Creek, Colo.; Indian Stream, Me. 9th, Collegeville, Fergus Falls, and Maple Plain, Minn.; Gallatin, Grand Forks, Lakota, and Wild Rice, N. Dak.; Webster, S. Dak.; Crandon, Wis. 10th, Barron, Wis. 12th, Grand Haven, Mich.; Gallatin, N. Dak.; Barron, Wis. 13th, Stevenson, Conn. 14th, Grundy Center, Iowa; Cincinnati, Ohio. 17th, Chelsea and Woodstock, Vt. 18th, Houlton, Me.; Marquette, Mich.; Alexandria, Bingham Lake, and Fergus Falls, Minn.; Butternut, Medford, Shell Lake, and Valley Junction, Wis.

19th, Belfast, East Machias, and Houlton, Me.; Alpena and Marquette, Mich.; Bingham Lake, Minn.; Havre, Mont.; Napoleon, N. Dak.; Frankfort, Gary, and Webster, S. Dak.; Barron, Wis. 20th, Alexandria, Minn.; Bismarck and Napoleon, N. Dak. 21st, Alta, Iowa; Cornish, Farmington, Gardiner, Houlton, Indian Stream, and Presque Isle, Me.; Concord and Leominster, Mass.; Bingham Lake, Clear Lake, Fergus Falls, and Saint Olaf, Minn.; Glendive and Havre, Mont.; Bethlehem and Hanover, N. H.; Malone, N. Y.; Ashley,

Bismarck, Fort Buford, Grand Rapids, and Wild Rice, N. Dak.; Castlewood, S. Dak.; Chelsea, Northfield, and Hyde Park, Vt.; Grantsburg, Wis. 22d, Grand Rapids, N. Dak.; Castlewood, S. Dak. 24th, Placerville, Cal.; Cresco, Iowa; Savoy, Mass. 28th, Hastain, Mo. 31st, Mitchell, S. Dak.

## THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 9, on the 28th; in 6 on the 19th; in 5 on the 11th; in 4 on the 12th, 18th, and 29th; in 3 on the 1st, 14th, 15th, and 27th; in 2 on the 9th, 17th, and 30th; and in 1 on the 7th, 16th, 24th, 26th, and 31st. No thunderstorms were reported on the 2d to 6th, 8th, 10th, 13th, and 20th to 23d.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 8, in Florida; on 7 in Mississippi; on 6 in Alabama and Georgia; on 5 in Louisiana; on 3 in Illinois, Indiana, Missouri, and Ohio; on 2 in Iowa, Michigan, and South Carolina; and on 1 in Connecticut, Kansas, North Carolina, South Dakota, Texas, and Wisconsin.

West of the Rocky Mountains thunderstorms were reported in California on the 27th, and in Utah on the 27th and 30th.

## STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for January, 1893, of the directors of the various state weather services:

## ALABAMA.

**Temperature.**—Maximum, 79, at Geneva, 2d; minimum, —8, at Newburg, 20th; greatest monthly range, 82, at Florence; least monthly range, 47, at Mobile, Tuscumbia, and Daphne.

**Precipitation.**—Greatest monthly, 6.93, at Maysville; least monthly, 0.37, at Tuscumbia.

**Wind.**—Prevailing direction, northwest.—P. H. Mell, *Observer, Weather Bureau, Auburn, director.*

## ARIZONA.

**Temperature.**—Maximum, 80, at Fort Mohave, 15th, and at Rancho del Pueblo, 3d to 7th; minimum, 4, at Flagstaff, 18th and 20th; greatest monthly range, 59, at San Carlos; least monthly range, 35, at Oracle.

**Precipitation.**—Greatest monthly, 1.92, at Flagstaff; least monthly, 0.00, at Gila Bend, Palomas, Rancho del Pueblo, and Teviston.

**Wind.**—Prevailing direction, southwest.—W. Burrows, *Observer, Weather Bureau, Tucson, director.*

## ARKANSAS.

**Temperature.**—The mean was 2.0 below the normal; maximum, 80, at Camden, 27th; minimum, —13, at Harrison, 19th; greatest monthly range, 83, at Harrison; least monthly range, 47, at Greenville, Miss.

**Precipitation.**—The average was 8.52 below the normal; greatest monthly, 4.63, at Greenville, Miss.; least monthly, 0.15, at Warm Springs.

**Wind.**—Prevailing direction, north.—M. F. Locke, *Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Local Forecast Official, Weather Bureau, assistant.*

## CALIFORNIA.

**Temperature.**—Maximum, 89, at Rialto, 6th; minimum, 9, at Susanville,

31st; greatest monthly range, 59, at San Jacinto; least monthly range, 16, at Williams.

**Precipitation.**—Greatest monthly, 11.70, at Glendora; least monthly, trace, at Needles.

**Wind.**—Prevailing direction, south.—J. A. Barwick, *Observer, Weather Bureau, Sacramento, director.*

## COLORADO.

**Temperature.**—The mean was above the normal; maximum, 81, at Orchard, 5th; minimum, —16, at Breckenridge, 28th, and at Orchard, 31st; greatest monthly range, 97, at Orchard; least monthly range, 36, at Climax.

**Precipitation.**—Greatest monthly, 4.60, at Climax; least monthly, 0.00, at Orchard and Monte Vista.—J. J. Gilligan, *Observer, Weather Bureau, Denver, director.*

## FLORIDA.

**Temperature.**—Maximum, 80, at Key West, 28th, and at Archer, 31st; minimum, 20, at Archer, 14th; greatest monthly range, 60, at Archer; least monthly range, 26, at Key West.

**Precipitation.**—Greatest monthly, 5.41, at Hypoluxo; least monthly, 0.43, at Saint Augustine.

**Wind.**—Prevailing direction, northwest.—E. R. Demain, *Observer, Weather Bureau, Jacksonville, director.*

## GEORGIA.

The month was noted for the longest continued cold weather and the heaviest snowfall known in years.

**Temperature.**—Maximum, 78, at Darien, 2d; minimum, —1, at Adairsville, 21st; greatest monthly range, 69, at Adairsville; least monthly range, 47, at Columbus.

**Precipitation.**—Greatest monthly, 4.75, at Blakely; least monthly, 0.72, at Waynesboro.

**Wind.**—Prevailing direction, northwest.—*Park Morrill, Local Forecast Official, Weather Bureau, Atlanta, director.*

#### IDAHO.

**Temperature.**—Maximum, 54, at Boise Barracks, 1st; minimum, —32, at Bonanza City, 30th; greatest monthly range, 72, at Bonanza City; least monthly range, 42, at Garden Valley.

**Precipitation.**—Greatest monthly, 2.00, at Garden Valley; least monthly, 0.22, at Boise Barracks.—*J. H. Smith, Observer, Weather Bureau, Idaho Falls, director.*

#### ILLINOIS.

The month was the coldest January experienced in many years.

**Temperature.**—The mean was 8.3 below the normal; maximum, 63, at McLeansboro, 28th; minimum, —20, at Oswego and Ottawa, 17th, and at Hennepin, 17th and 18th.

**Precipitation.**—The average was 1.08 below the normal; greatest monthly, 2.61, at Mount Carmel; least monthly, 0.20, at Muddy Valley.

**Wind.**—Prevailing direction, northwest.—*John Craig, Observer, Weather Bureau, Springfield, director.*

#### INDIANA.

The month was the coldest January on record.

**Temperature.**—The mean was 7.1 below the normal; maximum, 64, at Marengo and New Albany, 28th; minimum, —25, at Lafayette, 15th; greatest monthly range, 78, at Marengo; least monthly range, 59, at Mount Vernon.

**Precipitation.**—The average was 0.45 below the normal; greatest monthly, 4.40, at Hammond; least monthly, 0.98, at Huntingburg.

**Wind.**—Prevailing direction, northwest.—*Prof. H. A. Huston, Lafayette, director; C. F. R. Wappenhans, Local Forecast Official, Weather Bureau, assistant.*

#### IOWA WEATHER AND CROP SERVICE.

**Temperature.**—The mean was about 7.0 below the normal; maximum, 54, at Glenwood, 4th; minimum, —34, at Decorah, 14th; greatest monthly range, 75, at Charles City; least monthly range, 49, at Grinnell.

**Precipitation.**—The average was about 0.74 below the normal; greatest monthly, 3.20, at Havelock; least monthly, 0.18, at Larabee.

**Wind.**—Prevailing direction, northwest.—*J. R. Sage, Des Moines, director; G. M. Chappel, Local Forecast Official, Weather Bureau, assistant.*

#### KANSAS.

**Temperature.**—The mean was 1.6 below the normal; maximum, 76, at Shields, 24th, and at Kiowa, 31st; minimum, —11, at New England Ranch, 31st; greatest monthly range, 81, at New England Ranch; least monthly range, 47, at Fort Riley.

**Precipitation.**—The average was 0.81 below the normal; greatest monthly, 0.73, at Lebo; least monthly, 0.00, at Cawker City and Kerwin.

**Wind.**—Prevailing direction, northwest.—*T. B. Jennings, Observer, Weather Bureau, assistant.*

#### KENTUCKY.

**Temperature.**—The mean was 7.1 below the normal; maximum, 67, at Hendricks and Springfield, 27th and 28th; minimum, —22, at Hendricks and Louisa, 11th; greatest monthly range, 89, at Hendricks; least monthly range, 57, at Richmond.

**Precipitation.**—The average was 2.13 below the normal; greatest monthly, 6.37, at Richmond; least monthly, 0.11, at Robard.

**Wind.**—Prevailing direction, west.—*Frank Burke, Local Forecast Official, Weather Bureau, Louisville, director.*

#### LOUISIANA.

**Temperature.**—The mean was slightly below the normal; maximum, 71, at Clinton, 30th and 31st, at Rayne and Lafayette, 29th, and at Donaldsonville and Houma, 31st; minimum, 16, at Davis, 19th; greatest monthly range, 58, at Cameron; least monthly range, 35, at Port Eads.

**Precipitation.**—The average was 3.14 below the normal; greatest monthly, 4.15, at Amite; least monthly, 1.06, at Shreveport.

**Wind.**—Prevailing direction, north.—*R. E. Kerkam, Local Forecast Official, Weather Bureau, New Orleans, director.*

#### MARYLAND.

**Temperature.**—Maximum, 58, at Cumberland, Edgemont, and Leonardtown, 27th; minimum, —17, at Denton, 18th; greatest monthly range, 73, at Denton; least monthly range, 25, at Cambridge.

**Precipitation.**—Greatest monthly, 3.50, at Sunnyside; least monthly, 0.72, at Cumberland.

**Wind.**—Prevailing direction, northwest.—*Dr. William B. Clark, Johns Hopkins University, Baltimore, director; Prof. Milton Whitney, Maryland Agricultural College, secretary and treasurer; C. P. Cronk, Observer, Weather Bureau, in charge.*

#### MICHIGAN.

**Temperature.**—The mean was 8.7 below the normal; maximum, 49, at Adrian and Clinton, 28th; minimum, —31, at Paris, 15th.

**Precipitation.**—The average was 0.37 above the normal; greatest monthly, 5.20, at Berrien Springs (a); least monthly, 0.44, at East Tawas.

**Wind.**—Prevailing direction, northwest.—*E. A. Evans, Local Forecast Official, Weather Bureau, Detroit, director.*

#### MINNESOTA.

**Temperature.**—Maximum, 39, at Camden, 6th and 8th; minimum, —40, at Pokegama Falls, 14th; greatest monthly range, 76, at Saint Vincent; least monthly range, 54, at Grand Meadow and Albert Lea.

**Precipitation.**—Greatest monthly, 2.63, at Sandy Lake Dam; least monthly, 0.15, at Saint Vincent and Holland.

**Wind.**—Prevailing direction, northwest.—*J. H. Harmon, Observer, Weather Bureau, Minneapolis, director.*

#### MISSISSIPPI.

**Temperature.**—The mean was 2.9 below the normal; maximum, 77, at Enterprise, 31st, and at Vaiden, 25th; minimum, —3, at Batesville, 20th; greatest monthly range, 69, at Louisville; least monthly range, 38, at Ship Island.

**Precipitation.**—The average was 2.64 below the normal; greatest monthly, 8.02, at Clarksdale; least monthly, 0.80, at Kosciusko.

**Wind.**—Prevailing direction, north.—*R. J. Hyatt, Local Forecast Official, Weather Bureau, Vicksburg, director.*

#### MISSOURI.

**Temperature.**—The mean was 5.2 below the normal; maximum, 66, at Gainesville, 24th, at Grovedale, 28th, and at Neosho, 25th; minimum, —14, at Pickering, 18th; greatest monthly range, 76, at Neosho; least monthly range, 48, at Concordia, Rea, and Stanberry.

**Precipitation.**—The average was 1.56 below the normal; greatest monthly, 1.75, at Brunswick; least monthly, 0.00, at Louisiana and West Plains.

**Wind.**—Prevailing direction, northwest.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; H. A. McNally, Observer, Weather Bureau, assistant.*

#### MONTANA.

**Temperature.**—Maximum, 62, at Fort Custer, 8th; minimum, —45, at Corbin, Fort Logan, and Hogan, 31st; greatest monthly range, 101, at Helena and Fort Custer; least monthly range, 45, at Horr.

**Precipitation.**—Greatest monthly, 2.60, at Martinsdale; least monthly, 0.31, at Virginia City.

**Wind.**—Prevailing direction, southwest.—*E. J. Glass, Observer, Weather Bureau, Helena, director.*

#### NEBRASKA.

**Temperature.**—Maximum, 82, at Mullen, 3d; minimum, —22, at Hay Springs, 31st; greatest monthly range, 92, at Mullen; least monthly range, 47, at Syracuse.

**Precipitation.**—Greatest monthly, 0.86, at Creighton; least monthly, 0.00, at several stations.

**Wind.**—Prevailing direction, northwest.—*Prof. Goodwin D. Swetey, Crete, director; G. A. Loveland, Observer, Weather Bureau, assistant.*

#### NEVADA.

**Temperature.**—The mean was 4.2 above the normal; maximum, 65, at Pioche, 5th and 8th, at Sunnyside, 4th and 8th, at Tybo, 7th and 9th, and Palmetto, 3d; minimum, —28, at Elko, 20th; greatest monthly range, 80, at Sunnyside and Halleck; least monthly range, 37, at Hawthorne.

**Precipitation.**—The average was 0.01 below the normal; greatest monthly, 4.75, at Lewers Ranch; least monthly, 0.12, at Empire Ranch.

**Wind.**—Prevailing direction, south.—*Prof. Charles W. Friend, Carson City, director; F. A. Carpenter, Observer, Weather Bureau, assistant.*

#### NEW ENGLAND.

**Temperature.**—The mean was 6.2 below the normal; maximum, 55, at Fort Kent, Me., 2d; minimum, —39, at Fort Kent, 22d; greatest monthly range, 94, at Fort Kent; least monthly range, 40, at Nantucket.

**Precipitation.**—The average was 1.24 below the normal; greatest monthly, 4.10, at Taunton (c), Mass.; least monthly, 0.70, at Burlington, Vt.

**Wind.**—Prevailing direction, northwest.—*J. Warren Smith, Observer, Weather Bureau, Boston, director.*

#### NEW JERSEY.

The month was the coldest January on record.

**Temperature.**—The mean was 7.9 below the normal; maximum, 54, at Beverly and Moorestown, 1st, at Lancewood and Mount Holly, 1st and 2d, and at Toms River, 2d; minimum, —21, at Blairstown, 17th, and at River Vale, 18th; greatest monthly range, 74, at River Vale; least monthly range, 51, at Newark.

**Precipitation.**—The average was 0.86 below the normal; greatest monthly, 4.56, at Boonton; least monthly, 1.87, at Belvidere.

**Wind.**—Prevailing direction, northwest.—*E. W. McGann, Observer, Weather Bureau, New Brunswick, director.*

#### NEW MEXICO.

**Temperature.**—Maximum, 78, at Deming, 7th; minimum, —4, at Halls Peak, 18th, and at Monero, 1st; greatest monthly range, 68, at Halls Peak; least monthly range, 39, at Santa Fe.

**Precipitation.**—Greatest monthly, 1.73, at Chama; least monthly, 0.00, at Albert, Bloomfield, and Folsom.

**Wind.**—Prevailing direction, northeast.—*H. B. Hersey, Observer, Weather Bureau, Santa Fe, director.*

#### NEW YORK.

**Temperature.**—The mean was 8.1 below the normal; maximum, 55, at Eden Center, 29th; minimum, —28, at Binghamton, 17th; greatest monthly range, 77, at Binghamton; least monthly range, 46, at Fort Niagara.

**Precipitation.**—The average was 0.53 below the normal; greatest monthly, 8.52, at Cherry Creek; least monthly, 0.55, at Avon.

**Wind.**—Prevailing direction, northwest.—*Prof. E. A. Fuertes, Dean of the College of Civil Engineering, Cornell University, Ithaca, director; R. M. Hardinge, Observer, Weather Bureau, assistant.*

#### NORTH CAROLINA.

The month was the coldest January since 1857.

**Temperature.**—The mean was 10.7 below the normal; maximum, 76, at Rockingham, 25th; minimum, —17, at Bakersville, 20th; greatest monthly range, 80, at Bakersville; least monthly range, 52, at Hatteras.

**Precipitation.**—The average was 1.63 below the normal; greatest monthly, 5.54, at Columbus; least monthly, 1.34, at Lynn.

**Wind.**—Prevailing direction, northwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Observer, Weather Bureau, assistant.*

#### NORTH DAKOTA.

**Temperature.**—The mean was 1.7 above the normal; maximum, 52, at Medora, 18th; minimum, —48, at Fort Stevenson, 31st, and at Willow City, 29th; greatest monthly range, 89, at Medora; least monthly range, 66, at Milton and Grand Forks.

**Precipitation.**—The average was 0.34 above the normal; greatest monthly, 2.54, at Fort Yates; least monthly, 0.15, at Saint Vincent, Minn.

**Wind.**—Prevailing direction, northwest.—*W. H. Fallon, Observer, Weather Bureau, Bismarck, director.*

#### OKLAHOMA.

**Temperature.**—Maximum, 79, at Purcell, 28th, and at Fort Supply, 31st; minimum, —7, at Burnett, 19th; greatest monthly range, 81, at Purcell; least monthly range, 60, at Gwendale.

**Precipitation.**—Greatest monthly, 2.95, at Fort Sill; least monthly, trace, at Gate City.

**Wind.**—Prevailing direction, north.—*J. I. Widmeyer, Observer, Weather Bureau, Oklahoma City, director.*

#### OREGON.

**Temperature.**—The mean was 1.6 below the normal; maximum, 70, at Newport, 8th; minimum, —17, at Heppner, 31st; greatest monthly range, 84, at Heppner; least monthly range, 29, at Gardiner.

**Precipitation.**—The average was 8.71 below the normal; greatest monthly, 6.62, at Langlois; least monthly, 0.29, at Fife.

**Wind.**—Prevailing direction, southwest.—*Hon. H. E. Hayes, Master State Grange, Portland, director; B. S. Pague, Local Forecast Official, Weather Bureau, assistant.*

#### PENNSYLVANIA.

**Temperature.**—The mean was 8.2 below the normal; maximum, 57, at Pittsburgh, 28th; minimum, —25, at Saegerstown, 15th; greatest monthly range, 74, at Saegerstown; least monthly range, 49, at Harrisburg.

**Precipitation.**—The average was 0.58 below the normal; greatest monthly, 5.48, at Wysox; least monthly, 1.65, at Altoona.

**Wind.**—Prevailing direction, northwest.—*Under direction of the Franklin Institute, Philadelphia; H. L. Ball, Observer, Weather Bureau, assistant.*

#### SOUTH CAROLINA.

**Temperature.**—Minimum, 3, at Cheraw, 21st; greatest monthly range, 62, at Cheraw; least monthly range, 47, at Port Royal.

**Precipitation.**—Greatest monthly, 4.20, at Trial; least monthly, 0.91, at Cheraw.—*B. R. Stuart, Observer, Weather Bureau, Columbia, director.*

#### SOUTH DAKOTA.

**Temperature.**—The mean was 2.0 above the normal; maximum, 63, at Rapid City, 3d; minimum, —44, at Ashcroft, 31st; greatest monthly range, 96, at Ashcroft; least monthly range, 59, at Sioux Falls.

**Precipitation.**—The average was 0.02 below the normal; greatest monthly, 1.52, at Webster; least monthly, trace, at Onida and Vermillion.

**Wind.**—Prevailing direction, northwest.—*S. W. Glenn, Local Forecast Official, Weather Bureau, Huron, director.*

#### TENNESSEE WEATHER AND CROP SERVICE.

The month was characterized by low temperature and deficiency in rainfall.

**Temperature.**—The mean was 5.0 below the normal; maximum, 69, at Chattanooga, 29th; minimum, —20, at Greeneville and Springdale, 16th; greatest monthly range, 84, at Springdale; least monthly range, 55, at Memphis.

**Precipitation.**—The average was 3.66 below the normal; greatest monthly, 3.23, at Rogersville; least monthly, 0.20, at Waynesboro.

**Wind.**—Prevailing directions, north and northwest.—*J. B. Marbury, Local Forecast Official, Weather Bureau, Nashville, director.*

#### TEXAS.

**Temperature.**—The mean was 0.4 above the normal; maximum, 90, at Fort Ringgold, 15th; minimum, 1, at Camp Pena Colorado, 18th; greatest monthly range, 75, at Fort Hancock; least monthly range, 28, at Orange.

**Precipitation.**—The average was 0.55 below the normal; greatest monthly, 5.91, at Corpus Christi; least monthly, 0.00, at Luling and Camp Pena Colorado.

**Wind.**—Prevailing direction, north.—*D. D. Bryan, Galveston, director; I. M. Cline, Local Forecast Official, Weather Bureau, assistant.*

#### UTAH.

**Temperature.**—Maximum, 71, at Saint George, 31st; minimum, —28, at Scofield, 20th; greatest monthly range, 79, at Scofield; least monthly range, 41, at Lake Park.

**Precipitation.**—Greatest monthly, 2.01, at Mount Carmel; least monthly, 0.40, at Loa.

**Wind.**—Prevailing direction, northwest.—*G. N. Salisbury, Observer, Weather Bureau, Salt Lake City, director.*

#### VIRGINIA.

**Temperature.**—Maximum, 77, at Ashland, 27th; minimum, —26, at Big Stone Gap, 15th; greatest monthly range, 93, at Ashland; least monthly range, 58, at Birdsnest.

**Precipitation.**—Greatest monthly, 4.45, at Birdsnest; least monthly, 10.1, at Staunton.

**Wind.**—Prevailing direction, northwest.—*Dr. E. A. Craighill, Lynchburg, director; J. N. Ryker, Observer, Weather Bureau, assistant.*

#### WASHINGTON.

**Temperature.**—Maximum, 63, at Walla Walla, 4th; minimum, —30, at Waterville, 31st; greatest monthly range, 77, at Waterville; least monthly range, 43, at Aberdeen.

**Precipitation.**—Greatest monthly, 11.33, at Neah Bay; least monthly, 0.19, at Ellensburg.

**Wind.**—Prevailing direction, south.—*H. F. Alciatore, Observer, Weather Bureau, Olympia, director.*

#### WEST VIRGINIA.

**Temperature.**—Maximum, 71, at Huntington, 30th; minimum, —25, at Spencer, 11th; greatest monthly range, 90, at Spencer; least monthly range, 58, at Martinsburg, Pleasant Hill, and Wheeling.

**Precipitation.**—Greatest monthly, 7.06, at Spencer; least monthly, 1.10, at New Cumberland.

**Wind.**—Prevailing direction, west.—*W. W. Dent, Observer, Weather Bureau, Parkersburg, director.*

#### WISCONSIN.

**Temperature.**—The mean was about 10 below the normal; maximum, 40, at Delavan and Grantsburg, 23d, and at Sharon, 28th; minimum, —40, at Osceola Mills and Whitehall, 14th; greatest monthly range, 78, at Whitehall; least monthly range, 43, at Lincoln and Oshkosh.

**Precipitation.**—The average was about normal; greatest monthly, 2.58, at Depere; least monthly, 0.44, at Butternut.

**Wind.**—Prevailing direction, northwest.—*W. L. Moore, Local Forecast Official, Weather Bureau, Milwaukee, director.*

#### WYOMING.

**Temperature.**—Maximum, 63, at Arland, 9th; minimum, —34, at Fort McKinney, 31st; greatest monthly range, 94, at Fort McKinney; least monthly range, 54, at Cheyenne.

**Precipitation.**—Greatest monthly, 1.82, at Fort Yellowstone; least monthly, trace, at Lander and Laramie.

**Wind.**—Prevailing direction, northwest.—*E. M. Ravenscraft, Observer, Weather Bureau, Cheyenne, director.*

## METEOROLOGICAL TABLES.

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, January, 1893.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Alabama.	0	0	0	Ins.	Arkansas—Cont'd.	0	0	0	Ins.
Alico	75	20	45.0	....	Arkansas City <sup>†</sup>	305	30	46.8	5.40
Bermuda <sup>a</sup> <sup>b</sup>	72	18	42.4	2.11	Brinkley <sup>†</sup>	62	13	35.1	1.60
Brewton	74	16	43.8	5.35	Camden <sup>a</sup> <sup>b</sup>	....	1.97	....	....
Citronelle <sup>†</sup>	70	22	47.8	4.30	Camden <sup>a</sup> <sup>b</sup>	80	14	41.8	0.95
Claiborne Landing <sup>†</sup>	....	3.51	....	Conway <sup>†</sup>	64	1	32.6	1.00	
Cordova <sup>†</sup>	2.69	....	....	Corning <sup>†</sup>	68	6	31.8	0.32	
Daphne <sup>†</sup>	68	21	45.3	2.61	Dallas <sup>†</sup>	66	5	40.8	0.82
Decatur <sup>†</sup>	....	2.49	....	Dardanelle <sup>†</sup>	....	....	0.30	....	
Demopolis <sup>†</sup>	....	1.00	....	Eldorado <sup>†</sup>	72	17	45.0	0.50	
Fayette	70	8	39.5	1.95	Fayetteville <sup>†</sup>	66	0	34.5	0.74
Florence <sup>a</sup> <sup>b</sup>	....	1.85	....	Forrest <sup>†</sup>	70	3	41.5	1.89	
Florence <sup>b</sup> <sup>†</sup>	70	— 6	36.4	2.99	Fulton <sup>†</sup>	....	....	1.00	....
Gadsden <sup>†</sup>	....	3.20	....	Gaines Landing <sup>†</sup>	67	12	1.40	....	
Genova <sup>†</sup>	79	26	48.6	2.70	Harrison <sup>†</sup>	70	— 13	35.0	1.40
Greensboro <sup>†</sup>	74	12	41.6	2.42	Helena <sup>a</sup> <sup>b</sup>	....	3.29	....	....
Healing Springs <sup>†</sup>	71	19	44.1	5.22	Helena <sup>b</sup>	66	6	35.8	1.76
Highland Home <sup>†</sup>	70	16	42.0	4.78	Hope <sup>†</sup>	68	14	42.0	0.50
Livingston <sup>a</sup> <sup>b</sup>	73	12	39.0	2.06	Hot Springs	71	3	39.4	2.56
Livingston <sup>†</sup>	....	2.58	....	Keesacee Ferry <sup>†</sup>	68	1	33.6	0.50	
Lynn <sup>a</sup> <sup>b</sup>	....	3.13	....	Kirby	68	6	41.7	1.20	
Mayaville <sup>†</sup>	62	7	34.3	1.82	Lonoke <sup>†</sup>	66	— 2	41.6	2.05
Mount Willing <sup>†</sup>	70	8	37.9	6.93	Madding <sup>†</sup>	....	37.8	1.10	....
Newbern <sup>†</sup>	72	12	40.3	1.88	Melbourne <sup>†</sup>	67	— 1	33.4	0.50
Newberg <sup>†</sup>	70	— 8	37.6	2.41	Mount Nebo <sup>†</sup>	64	8	37.0	1.35
Oxanna <sup>a</sup> <sup>b</sup>	66	5	35.6	3.06	New Gasconsy <sup>†</sup>	68	8	40.5	1.00
Scottsboro <sup>†</sup>	70	— 5	35.6	1.18	Newport <sup>a</sup> <sup>b</sup>	....	1.22	....	....
Selma <sup>a</sup> <sup>b</sup>	....	3.16	....	Newport <sup>†</sup>	64	3	31.9	0.86	
Sturdevant <sup>†</sup>	....	0.88	....	Osceola <sup>†</sup>	68	7	37.4	0.32	
Talladega <sup>†</sup>	....	3.47	....	Ozark <sup>†</sup>	63	0	38.2	0.76	
Tallassee Falls <sup>†</sup>	....	3.83	....	Pine Bluff <sup>†</sup>	72	6	42.4	1.10	
Tuscaloosa <sup>†</sup>	....	3.08	....	Prescott	70	15	42.0	0.65	
Tuscaloosa <sup>a</sup> <sup>b</sup>	67	7	34.8	1.47	Rogers <sup>†</sup>	66	— 9	30.4	1.09
Tuscaloosa <sup>b</sup> <sup>†</sup>	....	1.53	....	Russellville <sup>†</sup>	65	6	37.5	1.70	
Union	70	14	43.3	2.55	Searcy <sup>†</sup>	66	0	36.4	0.95
Union Springs <sup>a</sup> <sup>b</sup>	71	15	40.0	4.82	Stuttgart <sup>†</sup>	67	0	39.0	0.67
Valley Head <sup>†</sup>	65	— 6	31.0	2.10	Texarkana <sup>†</sup>	71	20	48.7	0.62
Warrior <sup>†</sup>	....	2.55	....	Warm Springs	....	....	0.15	....	
Wetumpka <sup>†</sup>	16	....	3.24	....	Warren <sup>†</sup>	74	10 <sup>b</sup>	41.8 <sup>b</sup>	1.50
Wilsonville <sup>†</sup>	....	2.64	....	Washington <sup>†</sup>	68	13	42.4	0.69	
Alaska.	....	....	....	Winslow <sup>†</sup>	66	3	33.3	0.86	
Killisnoo <sup>†</sup>	42	0	27.8	8.10	California.	....	....	....	....
Metlakahtla <sup>†</sup>	52	0	34.3	14.81	Agnew <sup>†</sup>	65	31	46.9	3.13
Arizona.	....	....	....	Alcalde <sup>†</sup>	66	26	43.4	0.51	
Antelope Valley	....	0.67	....	Alvarado <sup>†</sup>	70	32	50.5	2.85	
Aria. Can. Co. Dam.	77	31	55.2	0.08	Anderson <sup>†</sup>	64	24	39.7	3.44
Benson <sup>†</sup>	75	28	49.8	2.26	Antioch <sup>†</sup>	66	30	46.1	2.93
Bisbee <sup>†</sup>	70 <sup>a</sup>	28	46.8	0.03	Aptos <sup>†</sup>	70	39	51.1	3.40
Calabasas <sup>†</sup>	75	20	47.2	T.	Arcata	73	27	45.1	4.75
Casa Grande <sup>a</sup> <sup>b</sup>	73	26	53.5	0.06	Arlington Heights	85	34	58.5	2.71
Chiricahua Mts <sup>†</sup>	....	0.45	....	Athlone <sup>†</sup>	64	30	42.6	1.04	
Crittenden <sup>†</sup>	73	20	46.2	0.16	Auburn <sup>†</sup>	76	33	50.6	5.33
Dragoon	....	0.29	....	Bakersfield <sup>a</sup> <sup>b</sup>	69	32	45.7	0.61	
Dragoon Summit <sup>†</sup>	90	23	45.7	0.08	Bakersfield <sup>†</sup>	72	22	42.8	0.70
Dudleyville <sup>†</sup>	73	22	47.7	0.55	Ballast Point L. H.	....	1.25	....	....
Farleys Camp <sup>†</sup>	....	50.2	0.65	Beaumont <sup>†</sup>	86	40	57.6	2.97	
Flagstaff <sup>†</sup>	60	4	33.3	1.92	Belmont <sup>†</sup>	65	33	48.6	....
Florence <sup>†</sup>	75	23	52.2	0.24	Berendo <sup>†</sup>	65	35	47.0	1.05
Fort Apache	63	13	39.7	2.68	Berkeley	57	35	46.8	3.90
Fort Bowie	68	20	46.5	0.40	Biggs	....	2.47	....	....
Fort Grant	74	28	49.8	0.56	Bishop Creek <sup>†</sup>	69	26	42.8	1.23
Fort Huachuca	70	27	48.2	0.13	Boca <sup>†</sup>	58	6	27.4	4.55
Fort Mohave <sup>†</sup>	80	28	56.4	T.	Borden <sup>†</sup>	63	35	45.3	0.99
Gila Bend <sup>†</sup>	78	30	55.7	0.08	Boulder Creek <sup>†</sup>	68	28	45.1	2.65
Gila Bend <sup>a</sup> <sup>b</sup>	82	35	56.7	T.	Brentwood <sup>†</sup>	57	29	43.4	3.35
Holbrook <sup>†</sup>	63	7	35.4	0.10	Brighton <sup>†</sup>	59	35	43.9	2.91
Lochiel <sup>†</sup>	67	24 <sup>a</sup>	45.0	0.00	Byron <sup>†</sup>	62	32	44.5	2.57
Maricopa <sup>†</sup>	70	33	50.8	1.26	Caliente <sup>†</sup>	65	30	47.0	1.00
Mount Huachua <sup>†</sup>	70	20	46.4	0.32	Calistoga <sup>†</sup>	67	29	46.3	5.35
Natural Bridge <sup>†</sup>	....	0.95	....	Capitolia <sup>†</sup>	76	36	51.3	....	
Nogales <sup>†</sup>	72	22	47.8	0.10	Castrovile <sup>†</sup>	73	37	53.5	1.71
Oracle <sup>†</sup>	66	31	47.1	....	Centerville <sup>†</sup>	64	50	51.1	2.65
Oro	....	1.14	....	Chico <sup>†</sup>	68	32	45.8	5.54	
Palomas <sup>†</sup>	77	23	50.5	0.00	Chiso <sup>†</sup>	79	31	53.2	3.36
Pantano <sup>†</sup>	76	29	49.9	1.05	Citrus <sup>†</sup>	66	10	39.2	0.53
Payson <sup>†</sup>	70	22	39.3	1.05	Cloverdale <sup>†</sup>	60	32	45.5	2.25
Peoria <sup>†</sup>	73	31	52.8	0.12	Colegrove <sup>†</sup>	....	....	....	....
Phoenix <sup>†</sup>	80	23	54.4	0.00	Colfax <sup>†</sup>	88	27	50.3	3.29
Red Rock <sup>†</sup>	78	28	63.3	0.10	Colton <sup>†</sup>	78	30	54.6	2.40
Reyment <sup>†</sup>	70	34	52.8	0.56	Colusa <sup>†</sup>	55	34	42.3	3.29
Rye	....	0.50	....	Corning <sup>†</sup>	60	28	46.5	2.42	
San Carlos	76	17	44.7	2.70	Crescent City	....	....	....	....
San Simon <sup>†</sup>	79	28	49.0	0.00	Crescent City L. H.	70	34	51.6	2.23
Show Low	....	0.41	....	Crofton <sup>†</sup>	78	49	58.1	2.73	
Signal <sup>†</sup>	79	24	51.6	0.23	Davisville <sup>a</sup> <sup>b</sup>	65	35	45.7	3.43
Teviston	....	0.00	....	Davisville <sup>b</sup>	68	35	45.7	3.43	
Texas Hill <sup>†</sup>	79	26	56.5	0.00	Delano <sup>†</sup>	67	31	45.3	0.59
Tucson <sup>a</sup> <sup>b</sup>	74	26	50.8	0.27	Delta <sup>†</sup>	65	21	47.4	3.17
Tucson <sup>b</sup> <sup>†</sup>	74	30	53.3	0.25	Downey <sup>†</sup>	77	38	59.3	4.63
Walnut Grove	....	0.66	....	Drytown	58	26	39.8	4.59	
Walnut Ranch <sup>†</sup>	67	23	40.9	T.	El Dunes <sup>†</sup>	67	31	45.3	3.17
Whipple Barracks	70	13	40.7	1.18	El Dunes <sup>†</sup>	67	31	45.3	3.17
Wilcox <sup>†</sup>	....	0.15	....	El Dunes <sup>†</sup>	67	31	45.3	3.17	
Wilcox <sup>†</sup>	76	34	46.6	0.00	El Dunes <sup>†</sup>	67	31	45.3	3.17
Winslow <sup>†</sup>	64	16	36.2	0.10	El Dunes <sup>†</sup>	67	31	45.3	3.17
Wood Canyon	....	0.70	....	East Brother L. H.	....	....	....	....	
Yuma <sup>†</sup>	82	32	59.4	T.	Edgwood <sup>†</sup>	50	15	32.3	0.95
Arkansas.	....	0.75	....	Edmonton <sup>†</sup>	65	14	40.4	11.47	
Arkadelphia <sup>†</sup>	....	....	....	El Casco <sup>†</sup>	75	30	45.6	0.00	

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
Max.	Min.	Mean.	Max.	Min.	Mean.				



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## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
California—Cont'd.	0	0	0	Ins.	Colorado—Cont'd.	0	0	0	Ins.
Trinidad L H	37	37	37	6.61	Seibert	0	0	0	0.01
Tropico <sup>**</sup>	87	35	55.6	0.02	Sheridan Lake <sup>†</sup>	6	34.1	34.1	0.02
Truckee <sup>**</sup>	46	4	25.4	5.44	Smoky Hill Mine <sup>†</sup>	63	6	4.0	0.40
Tulare <sup>**</sup>	65	30	44.1	0.53	Stamford <sup>†</sup>	69	2	25.8	0.50
Tulare <sup>†</sup>	76	28	45.5	0.72	Sunnyside <sup>†</sup>	50	3	22.6	0.97
Tulare <sup>†</sup>	58	32	45.8	1.02	Surface Creek <sup>†</sup>	49	1	27.0	0.40
Turlock <sup>**</sup>	55	27	42.0	1.52	Table Rock	54	4	27.9	0.11
Ukiah <sup>†</sup>	64	27	43.6	4.75	T. S. Ranch	59	7	39.1	0.40
Upper Mattole <sup>†</sup>	69	33	43.7	6.01	Thon <sup>†</sup>	58	0	31.8	0.04
Vacaville <sup>**</sup>	66	32	43.6	4.50	Villa Grove <sup>†</sup>	.....	.....	.....	0.18
Vacaville <sup>†</sup>	64	32	45.2	1.73	Wallet <sup>†</sup>	.....	.....	T.	.....
Valley Springs <sup>**</sup>	66	32	45.0	3.24	Ward District	.....	.....	1.40	.....
Ventura <sup>†</sup>	86	37	57.7	3.17	Watkins <sup>†</sup>	60	18	36.3	0.05
Vina <sup>**</sup>	62	31	42.6	2.99	Wilde	.....	.....	.....	.....
Volcano Springs <sup>**</sup>	85	30	59.6	0.02	Yuma	.....	.....	T.	.....
Walnut Creek	58	30	43.7	4.41	Zuck	.....	.....	T.	.....
West Butte <sup>**</sup>	51	31	3.26	.....	Connecticut.	.....	.....	.....	.....
Westley <sup>**</sup>	63	31	44.1	1.38	Canton	42	9	17.2	3.47
Wheatland	58	32	41.8	3.16	Colchester	52	5	19.4	3.18
Whittier <sup>**</sup>	79	42	60.7	3.25	Falls Village	.....	.....	2.71	.....
Williams <sup>**</sup>	60	34	44.7	3.07	Hartford <sup>†</sup>	.....	.....	3.55	.....
Williams <sup>†</sup>	59	34	39.0	3.61	Lake Konomoc	.....	.....	2.72	.....
Willows <sup>†</sup>	53	26	41.7	4.32	Lebanon	.....	.....	3.71	.....
Willows <sup>**</sup>	55	30	43.2	4.80	Middletown	48	14	19.6	2.47
Winchester <sup>†</sup>	82	25	53.8	1.80	New Hartford <sup>†</sup>	33	19	11.0	3.69
Winters <sup>**</sup>	59	33	44.0	4.47	New Hartford <sup>b</sup>	.....	.....	3.69	.....
Woodland <sup>**</sup>	59	31	43.4	2.88	North Franklin	.....	.....	3.94	.....
Yerba Buena L. H.	.....	.....	.....	North Franklin	49	12	17.7	2.40	
Yreka <sup>†</sup>	.....	.....	.....	N. Grosvenor Dale	50	18	18.3	2.35	
Yuba City <sup>**</sup>	57	35	46.0	2.99	Northwalk <sup>†</sup>	50	18	18.3	2.35
Colorado—Cont'd.	0	0	0	Ins.	South Manchester	.....	.....	2.65	.....
Trinidad L H	37	37	37	6.61	Stevenson	.....	.....	3.36	.....
Tropic <sup>**</sup>	87	35	55.6	0.02	Storrs <sup>†</sup>	50	6	17.2	2.39
Truckee <sup>**</sup>	46	4	25.4	5.44	T. S. Thompson <sup>†</sup>	42	6	16.4	4.00
Tulare <sup>**</sup>	65	30	44.1	0.53	Voluntown <sup>†</sup>	52	18	20.8	3.10
Tulare <sup>†</sup>	76	28	45.5	0.64	Wallingford <sup>†</sup>	.....	.....	3.15	.....
Turlock <sup>**</sup>	58	32	45.8	1.02	Waterbury	42	10	19.9	2.96
Ukiah <sup>†</sup>	64	27	43.6	4.75	West Simsbury	.....	.....	3.53	.....
Upper Mattole <sup>†</sup>	69	33	43.7	6.01	Delaware.	.....	.....	3.36	.....
Vacaville <sup>**</sup>	66	32	43.6	4.50	Dover <sup>†</sup>	54	5	23.9	2.39
Valley Springs <sup>**</sup>	66	32	45.0	3.24	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Ventura <sup>†</sup>	86	37	57.7	3.17	Millsboro <sup>†</sup>	54	17	23.1	2.18
Vina <sup>**</sup>	62	31	42.6	2.99	Seaford <sup>†</sup>	57	5	23.9	2.13
Volcano Springs <sup>**</sup>	85	30	59.6	0.02	District of Columbia.	.....	.....	.....	.....
Walnut Creek	58	30	43.7	4.41	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
West Butte <sup>**</sup>	51	31	3.26	.....	Long Bridge <sup>†</sup>	50	1	15.5	1.55
Westley <sup>**</sup>	63	31	44.1	1.38	West Washington <sup>†</sup>	62	5	26.0	2.09
Wheatland	58	32	41.8	3.16	Florida.	.....	.....	.....	.....
Whittier <sup>**</sup>	79	42	60.7	3.25	Dover <sup>†</sup>	54	5	23.9	2.39
Williams <sup>**</sup>	60	34	44.7	3.07	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Williams <sup>†</sup>	59	32	39.7	0.05	Millsboro <sup>†</sup>	54	17	23.1	2.18
Willows <sup>†</sup>	52	4	12.1	4.60	Seaford <sup>†</sup>	57	5	23.9	2.13
Winchester <sup>†</sup>	82	25	53.8	1.80	District of Columbia.	.....	.....	.....	.....
Winters <sup>**</sup>	59	33	44.0	4.47	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
Woodland <sup>**</sup>	59	31	43.4	2.88	Long Bridge <sup>†</sup>	50	1	15.5	1.55
Yerba Buena L. H.	.....	.....	.....	West Washington <sup>†</sup>	62	5	26.0	2.09	
Yreka <sup>†</sup>	.....	.....	.....	Florida.	.....	.....	.....	.....	
Yuba City <sup>**</sup>	57	35	46.0	2.99	Dover <sup>†</sup>	54	5	23.9	2.39
Californian—Cont'd.	0	0	0	Ins.	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Trinidad L H	37	37	37	6.61	Millsboro <sup>†</sup>	54	17	23.1	2.18
Tropic <sup>**</sup>	87	35	55.6	0.02	Seaford <sup>†</sup>	57	5	23.9	2.13
Truckee <sup>**</sup>	46	4	25.4	5.44	District of Columbia.	.....	.....	.....	.....
Tulare <sup>**</sup>	65	30	44.1	0.53	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
Tulare <sup>†</sup>	76	28	45.5	0.64	Long Bridge <sup>†</sup>	50	1	15.5	1.55
Turlock <sup>**</sup>	58	32	45.8	1.02	West Washington <sup>†</sup>	62	5	26.0	2.09
Ukiah <sup>†</sup>	64	27	43.6	4.75	Florida.	.....	.....	.....	.....
Upper Mattole <sup>†</sup>	69	33	43.7	6.01	Dover <sup>†</sup>	54	5	23.9	2.39
Vacaville <sup>**</sup>	66	32	43.6	4.50	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Valley Springs <sup>**</sup>	66	32	45.0	3.24	Millsboro <sup>†</sup>	54	17	23.1	2.18
Ventura <sup>†</sup>	86	37	57.7	3.17	Seaford <sup>†</sup>	57	5	23.9	2.13
Vina <sup>**</sup>	62	31	42.6	2.99	District of Columbia.	.....	.....	.....	.....
Volcano Springs <sup>**</sup>	85	30	59.6	0.02	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
Walnut Creek	58	30	43.7	4.41	Long Bridge <sup>†</sup>	50	1	15.5	1.55
West Butte <sup>**</sup>	51	31	3.26	.....	West Washington <sup>†</sup>	62	5	26.0	2.09
Westley <sup>**</sup>	63	31	44.1	1.38	Florida.	.....	.....	.....	.....
Wheatland	58	32	41.8	3.16	Dover <sup>†</sup>	54	5	23.9	2.39
Whittier <sup>**</sup>	79	42	60.7	3.25	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Williams <sup>**</sup>	60	34	44.7	3.07	Millsboro <sup>†</sup>	54	17	23.1	2.18
Williams <sup>†</sup>	59	32	39.7	0.05	Seaford <sup>†</sup>	57	5	23.9	2.13
Willows <sup>†</sup>	52	4	12.1	4.60	District of Columbia.	.....	.....	.....	.....
Winchester <sup>†</sup>	82	25	53.8	1.80	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
Winters <sup>**</sup>	59	33	44.0	4.47	Long Bridge <sup>†</sup>	50	1	15.5	1.55
Woodland <sup>**</sup>	59	31	43.4	2.88	West Washington <sup>†</sup>	62	5	26.0	2.09
Yerba Buena L. H.	.....	.....	.....	Florida.	.....	.....	.....	.....	
Yreka <sup>†</sup>	.....	.....	.....	Dover <sup>†</sup>	54	5	23.9	2.39	
Yuba City <sup>**</sup>	57	35	46.0	2.99	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Californian—Cont'd.	0	0	0	Ins.	Millsboro <sup>†</sup>	54	17	23.1	2.18
Trinidad L H	37	37	37	6.61	Seaford <sup>†</sup>	57	5	23.9	2.13
Tropic <sup>**</sup>	87	35	55.6	0.02	District of Columbia.	.....	.....	.....	.....
Truckee <sup>**</sup>	46	4	25.4	5.44	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
Tulare <sup>**</sup>	65	30	44.1	0.53	Long Bridge <sup>†</sup>	50	1	15.5	1.55
Tulare <sup>†</sup>	76	28	45.5	0.64	West Washington <sup>†</sup>	62	5	26.0	2.09
Turlock <sup>**</sup>	58	32	45.8	1.02	Florida.	.....	.....	.....	.....
Ukiah <sup>†</sup>	64	27	43.6	4.75	Dover <sup>†</sup>	54	5	23.9	2.39
Upper Mattole <sup>†</sup>	69	33	43.7	6.01	Kirkwood <sup>†</sup>	50	6	18.4	4.00
Vacaville <sup>**</sup>	66	32	43.6	4.50	Millsboro <sup>†</sup>	54	17	23.1	2.18
Valley Springs <sup>**</sup>	66	32	45.0	3.24	Seaford <sup>†</sup>	57	5	23.9	2.13
Ventura <sup>†</sup>	86	37	57.7	3.17	District of Columbia.	.....	.....	.....	.....
Vina <sup>**</sup>	62	31	42.6	2.99	Dating Reserv <sup>†</sup>	53	5	23.6	2.16
Volcano Springs <sup>**</sup>	85	30	59.6	0.02	Long Bridge <sup>†</sup>	50	1	15.5	1.55
Walnut Creek	58	30	43.7	4.41	West Washington <sup>†</sup>	62	5	26.0	2.09
West Butte <sup>**</sup>	51	31	3.26	.....	Florida.	.....	.....	.....	.....
Westley <sup>**</sup>	63	31	44.1	1.38	Dover <sup>†</sup>	54	5	23.9	2.39
Wheat									

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature, (Fahrenheit.)			Precip'n.	Stations.	Temperature, (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Iowa—Cont'd.	0	0	0	Ins.	Kentucky—Cont'd.	0	0	0	Ins.
Newton	40	-17	9.1	0.67	Edmonton <sup>†</sup>	62	-5	26.5	1.38
Osage <sup>†</sup>	—	-20	2.6	0.85	Falmouth <sup>†</sup>	—	—	2.57	—
Oskaloosa <sup>†</sup>	40	-21	10.3	0.59	Frankfort <sup>†</sup>	—	—	1.65	—
Panama <sup>†</sup>	41	-13	12.2	0.29	Franklin <sup>†</sup>	65	—2	30.4	1.05
Richland <sup>†</sup>	40	-16	8.6	0.92	Greenbush <sup>†</sup>	63	—9	27.1	0.64
Sac City <sup>†</sup>	38	-18	8.3	0.14	Harrordsburg <sup>†</sup>	65	-13	23.3	1.95
Spirit Lake	40	-29	5.9	0.25	Hendricks <sup>†</sup>	67	-22	27.3	2.33
Storm Lake <sup>†</sup>	37	-16	11.1	0.17	Lagrange <sup>†</sup>	63	-13	23.3	1.47
Tipton <sup>†</sup>	37	-18	9.3	0.79	Louisa <sup>†</sup>	59	-22	21.1	1.78
Willisca <sup>†</sup>	43	—9	18.0	0.32	Matlock <sup>†</sup>	62	—4	30.6	1.50
Vinton <sup>†</sup>	31	-17	6.6	1.00	Middleboro <sup>†</sup>	63	-19	24.8	1.16
Washington	40	-14	11.9	0.89	Mount Sterling <sup>†</sup>	58	-13	21.8	2.39
Webster City <sup>†</sup>	37	-18	8.6	0.73	Paducah <sup>†</sup>	—	—	3.00	—
Williams <sup>†</sup>	34	-20	5.1	0.33	Paducah b <sup>†</sup>	64	4	31.0	1.90
Winterset <sup>†</sup>	42	-16	11.8	0.52	Pellville <sup>†</sup>	66	-10	26.3	2.32
Kansas.					Princeton <sup>†</sup>	64	—3	26.6	1.95
Abilene <sup>†</sup>	35	4	27.0	0.03	Richmond <sup>†</sup>	—	—	22.7	6.37
Allison <sup>†</sup>	63	0	25.6	0.12	Robard <sup>†</sup>	—	—	0.11	—
Altoona <sup>†</sup>	54	—1	24.0	0.35	Russellville <sup>†</sup>	62	—2	29.4	0.57
Atchison <sup>†</sup>	47	—4	21.5	0.11	Shelby City <sup>†</sup>	63	—7	25.7	2.68
Beloit <sup>†</sup>	8	—	—		Shelbyville <sup>†</sup>	63	-15	22.8	2.75
Bucklin <sup>†</sup>	—	—	—		South Fork <sup>†</sup>	77	—17	22.7	3.58
Buffalo Park <sup>†</sup>	67	7	36.2	0.02	Springfield <sup>†</sup>	62	-16	22.4	1.98
Cawker City <sup>†</sup>	66	0	28.5	5.7	Versailles <sup>†</sup>	—	—	2.80	—
Colby <sup>†</sup>	70	—3	31.1	T.	West Point <sup>†</sup>	65	-11	25.1	—
Cold Water	75	—3	32.1	T.	Wickliffe <sup>†</sup>	62	2	29.7	1.09
Collyer <sup>†</sup>	64	2	31.0	0.00	Williamsburg a <sup>†</sup>	—	—	2.06	—
Columbus <sup>†</sup>	63	—2	27.6	0.36	Williamsburg b <sup>†</sup>	62	-10	26.6	0.73
Cunningham <sup>†</sup>	68	3	28.4	0.03	Louisiana.				
Downs <sup>†</sup>	—	—	—	0.25	Abbeville <sup>†</sup>	82	24	50.4	2.15
Elico <sup>†</sup>	54	1	26.1	0.32	Amherst <sup>†</sup>	71	19	45.0	1.50
Eldorado <sup>†</sup>	64	6	30.6	0.68	Amherst <sup>Ex. St. n<sup>†</sup></sup>	50	—11	49.5	4.15
Ellis <sup>†</sup>	62	6	35.0	0.00	Baton Rouge <sup>†</sup>	75	25	47.6	2.34
Emporia <sup>†</sup>	57	4	26.5	0.05	Calhoun <sup>†</sup>	72	18	44.7	1.63
Englewood <sup>†</sup>	74	6	31.4	T.	Cameron <sup>†</sup>	77	18	50.0	1.93
Eureka Ranch <sup>†</sup>	62	1	31.0	0.27	Cheneyville <sup>†</sup>	71	26	48.9	1.74
Fort Riley <sup>†</sup>	46	1	21.4	T.	Clinton <sup>†</sup>	78 <sup>2</sup>	—	3.52	—
Gibson <sup>†</sup>	64	0	30.2	0.10	Coushatta a <sup>†</sup>	—	—	2.95	—
Gove City <sup>†</sup>	65	—2	29.4	0.50	Coushatta b <sup>†</sup>	76	20	47.4	1.56
Grainfield <sup>†</sup>	62	2	30.4	0.00	Covington <sup>†</sup>	68	22	42.8	—
Greensburg <sup>†</sup>	74	3	33.0	T.	Davis <sup>†</sup>	79	16	43.0	1.52
Grenola <sup>†</sup>	64	0	30.6	0.15	Delhi <sup>†</sup>	—	—	4.00	—
Grinnell <sup>†</sup>	66	0	27.8	0.05	Donaldsonville <sup>†</sup>	78	30	51.6	2.33
Havenaville <sup>†</sup>	43	—6	19.8	T.	Emilie <sup>†</sup>	73	26	48.9	2.11
Hays City <sup>†</sup>	68	12	37.0	0.05	Farmerville <sup>†</sup>	71 <sup>2</sup>	19	42.9	2.05
Hesston <sup>†</sup>	54	—3	28.8	0.06	Franklin <sup>†</sup>	75	26	50.2	1.89
Horton <sup>†</sup>	44	—5	20.4	0.21	Girard <sup>†</sup>	—	—	2.34	—
Hutchinson <sup>†</sup>	69	4	33.8	0.14	Grand Coteau <sup>†</sup>	73	28	49.7	3.08
Independence <sup>†</sup>	66	0	28.6	0.17	Hammond <sup>†</sup>	—	—	3.92	—
Kansas City <sup>†</sup>	50	—4	21.8	0.23	Homer <sup>†</sup>	70	20	44.0	0.12
Kellogg <sup>†</sup>	63	1	28.6	0.21	Houmat <sup>†</sup>	78	24	50.3	3.40
Kiowa <sup>†</sup>	76	8	37.1	0.04	Lafayette <sup>†</sup>	78	24	50.9	3.40
La Crosse <sup>†</sup>	75	—3	32.9	T.	Lake Charles <sup>†</sup>	73	21	50.1	2.50
Lakin <sup>†</sup>	70	—3	36.8	0.05	Lake Providence <sup>†</sup>	73	—	—	—
Lebo <sup>†</sup>	55	—9	24.5	0.73	Lawrence <sup>†</sup>	69	33	51.4	—
Leoti <sup>†</sup>	68	—2	32.8	0.10	Liberty Hill <sup>†</sup>	75	21	47.2	1.15
Liber <sup>†</sup>	69	—4	33.8	T.	Maurepas <sup>†</sup>	79	20	47.7	2.11
McAllaster <sup>†</sup>	66	0	25.2	0.15	Meilev <sup>†</sup>	79	26	49.6	3.92
McPherson <sup>†</sup>	60	2	27.6	0.04	Monroe <sup>†</sup>	79	26	49.5	3.92
Manhattan a <sup>†</sup>	—	—	—	Monroe <sup>†</sup>	79	—17	16.8	2.71	
Manhattan b <sup>†</sup>	53	—1	23.0	0.02	Mound Nonotuck <sup>†</sup>	—	—	3.45	—
Manhattan c <sup>†</sup>	47	2	21.4	T.	Mystic Lake <sup>†</sup>	73	23	46.5	1.55
Mankato <sup>†</sup>	65	3	24.0	T.	New Bedford a <sup>†</sup>	71 <sup>2</sup>	29	50.2	1.88
Marion <sup>†</sup>	59	1	26.1	0.12	Plain Dealing <sup>†</sup>	74	16	46.3	1.38
Minneapolis <sup>†</sup>	58	2	25.2	T.	Plaquemine <sup>†</sup>	67	26	44.2	2.88
Monument <sup>†</sup>	60	3	26.4	0.01	Rayne <sup>†</sup>	78	24	50.4	2.56
Morland <sup>†</sup>	65	4	30.6	0.04	Roseland <sup>†</sup>	77	22	47.7	2.89
Morse <sup>†</sup>	59	—6	20.4	T.	Saint Iberia <sup>†</sup>	71 <sup>2</sup>	19	42.0	2.05
Morton <sup>†</sup>	75	5	37.2	T.	Sainte Genevieve <sup>†</sup>	71 <sup>2</sup>	26	50.2	1.88
N. England Ranch <sup>†</sup>	70	—11	31.7	0.20	Sugar Ex. Station <sup>†</sup>	73	28	49.0	1.95
Oakley <sup>†</sup>	62	4	34.7	T.	Thibodeaux <sup>†</sup>	—	—	1.95	—
Oberlin <sup>†</sup>	—	—	—	Wallace <sup>†</sup>	77	27	49.8	2.67	
Oswego <sup>†</sup>	68	—7	28.5	0.30	West End <sup>†</sup>	—	—	3.00	—
Page City <sup>†</sup>	58	—3	28.0	0.15	Winnabro <sup>†</sup>	73	12	44.1	2.00
Phillipsburg <sup>†</sup>	65	2	27.2	T.	Maine.				
Pleasant Dale <sup>†</sup>	65	—3	25.0	0.01	Bar Harbor <sup>†</sup>	49 <sup>2</sup>	—5 <sup>2</sup>	14.9 <sup>2</sup>	3.34
Quinter <sup>†</sup>	67	—3	25.0	0.02	Belfast <sup>†</sup>	45	—3	14.0	3.99
Rome <sup>†</sup>	61	10	32.1	0.07	Calais <sup>†</sup>	54	—11	13.9	3.49
Salina <sup>†</sup>	55	5	26.5	T.	Cornish <sup>†</sup>	43	—8	13.2	1.90
Sedan <sup>†</sup>	65	2	29.7	0.20	East Machias <sup>†</sup>	48	—11	13.5	2.85
Sharon Springs <sup>†</sup>	70	8	30.8	0.10	Easton <sup>†</sup>	44	—15	7.0	—
Shields <sup>†</sup>	76	0	36.2	0.09	Fairfield <sup>†</sup>	48	—23	9.7	1.62
Sterling <sup>†</sup>	64	4	33.2	T.	Fort Kent <sup>†</sup>	49	—17	13.0	2.66
Syracuse <sup>†</sup>	72	1	32.4	T.	Gardiner <sup>†</sup>	47	—16	13.0	2.70
Tribune <sup>†</sup>	67	2	33.6	T.	Houlton <sup>†</sup>	46	—21	6.2	3.27
Ulysses <sup>†</sup>	71	12	35.2	0.05	Indiana Stream <sup>†</sup>	41	—20	5.5	2.47
Wa Keeney <sup>†</sup>	62	10	33.8	0.05	Kennebec Arsenal <sup>†</sup>	42	—18	8.9	2.09
Wakefield <sup>†</sup>	53	2	26.4	0.05	Kents Hill <sup>†</sup>	49	—10	10.5	2.41
Wallace a <sup>†</sup>	—	—	—	Lewiston <sup>†</sup>	48	—12	13.0	2.82	
Wallace b <sup>†</sup>	70	3	34.9	T.	Petit Menan <sup>†</sup>	40	—6	20.1	—
Wamago <sup>†</sup>	59	2	24.2	T.	Presque Isle <sup>†</sup>	40	—20	5.1	—
Wenkan <sup>†</sup>	68	7	—	West Jonesport <sup>†</sup>	46	—7	14.9	—	
Winona <sup>†</sup>	—	—	—	Maryland.					
Yates Center <sup>†</sup>	—	—	—	Bar Harbor Crk Spgs <sup>†</sup>	56	—10	23.6	1.64	
Kentucky.				Boettcherille <sup>†</sup>	54	—14	20.7	1.95	
Bowling Green <sup>†</sup>	65	—3	30.7	0.72	Cambridge <sup>†</sup>	53	4	27.0	2.71
Burkeville <sup>†</sup>	63	—3	27.6	1.30	Cumberland a <sup>†</sup>	55	—5	22.8	0.72
Burnside <sup>†</sup>	—	—	—	Cumberland b <sup>†</sup>	58	—3	25.3	1.30	
Caddo <sup>†</sup>	52	—14	19.5	3.62	Canton <sup>†</sup>	66	—17	24.5	1.90
Canton <sup>†</sup>	66	0	30.3	1.30	Denton <sup>†</sup>	66	—17	24.5	1.90
Carrollton <sup>†&lt;/sup</sup>									

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Mississippi—Cont'd.	0	0	0	Ins.	Missouri—Cont'd.	0	0	0	Ins.
Brookhaven†	76	15	45.4	1.77	Rea*1	42	-6	15.4	0.20
Canton†	68	20	43.0	2.61	Rolla†	59	-4	24.9	0.38
Clarkdale†	67	5	41.6	0.82	Saint Charles b	59	-	0.30	0.42
Columbus a†	.....	.....	3.26	.....	Saint Joseph†	60	-	23.8	0.19
Corinth†	.....	.....	1.54	.....	Saint Louis a	58	-	21.8	0.64
Crystal Springs†	75	19	45.4	2.56	Shelbyville	42	-	0.07	0.07
Duck Hill†	73	12	40.8	1.82	Strawberry*1	42	-6	17.9	0.29
Enterprise†	77	15	42.8	2.33	Steelville*1	60	0	28.0	0.28
Fayette†	75	20	48.6	2.54	Steffenville	61	-	0.70	0.70
Greenville	66	19	42.7	1.63	Stelladale†	61	-6	24.2	0.30
Greenville b	.....	.....	4.38	.....	Siblett	.....	-	0.32	0.28
Hattiesburg*†	73	23	48.5	4.40	Vanceville	.....	-	0.28	0.28
Kosciusko†	72	8	41.6	0.80	Vermont*†	51	-4	23.0	0.56
Lake†	68	16	40.3	2.98	Warrensburg*1	52	-1	23.5	0.41
Logtown†	71	25	47.6	4.50	Warrenton	60	-5	23.1	0.44
Louisville†	73	4	42.7	2.60	West Plains	59	-8	25.2	0.15
Macon	.....	.....	1.52	.....	Wheatland	.....	-	0.13	0.13
Moss Point†	68	22	46.7	.....	Whiteside	58	-10	20.3	0.36
Okolona†	70 <sup>f</sup>	10 <sup>f</sup>	39.0 <sup>f</sup>	2.37	Montana.	.....	.....	.....	.....
Palo Alto†	72	8	39.1	1.61	Boulder†	54	-39	18.4	1.53
Pontotoc†	66	4	39.2	4.30	Boszeman†	51	-36	21.9	0.39
Ship Island†	66	28	50.4	4.96	Camp Poplar River	45	-36	7.7	1.21
Vaiden†	77	6	39.6	1.86	Choteau	59	-41	26.0	1.50
Washington†	76	22	46.5	2.42	Cokedale*2	57	-	20.5	1.70
Water Valley*1	70	8	35.7	1.57	Deer Lodge City	51	-25	21.2	0.84
Waynesboro a	75	18	42.0	0.57	Elk Park†	48	-34	10.8	0.84
Yazoo City†	.....	.....	4.57	Fort Custer	62	-39	26.2	0.67	
Missouri.	.....	.....	.....	Fort Keogh	50	-28	18.6	0.66	
Annapolis	.....	.....	0.20	Fort Logan†	50	-45	15.4	0.96	
Appleton City†	62	-2	26.5	0.50	Fort Missoula	54	-8	21.5	1.95
Arlington†	.....	.....	0.31	Glendive	47	-38	13.5	1.70	
Arthur	.....	.....	0.20	Great Falls†	59	-38	27.0	1.61	
Bethany	46	-11	17.1	0.40	Hogan	52	-45	21.4	1.30
Big Piney	.....	.....	0.89	Horr	45	-27	20.4	0.55	
Boonville†	.....	.....	0.63	Martinsdale†	50	-40	20.7	2.60	
Brunswick	48	-9	21.5	0.75	Virginia City†	50	-24	24.0	0.31
Canton	.....	.....	0.92	Nebraska.	.....	.....	.....	.....	
Cape Girardeau†	.....	.....	0.40	Agee*1	52	-14	20.3	0.35	
Carrollton†	48*	-3	20.7	0.65	Albion	51	-20	20.2	T.
Carthage	.....	.....	0.49	Ansley†	58	-14	22.3	0.25	
Centerville	.....	.....	0.21	Arborville*1	52	-5	21.2	0.05	
Conception†	44	-10	18.1	0.43	Areadia	.....	.....	.....	.....
Concordia*2	46	-2	23.6	0.85	Ashland*1	46	-5	16.6	0.05
Cowgill	.....	.....	0.60	Bethel	46	-11	23.4	0.03	
Dadeville†	.....	.....	0.20	Benton	56	-11	23.4	0.03	
Darksville†	46	-8	20.9	1.00	Bishop	42	-10	17.7	0.21
East Lynne*1	53	9	23.6	0.42	Bassett*1	57	-18	20.5	T.
Edge Hill*2	.....	2	26.0	0.42	Beaver City	62	-3	30.6	T.
Eight Mile	51	-4	23.9	0.55	Burwell*1	40	-10	20.5	0.25
Eldon*1	56	-2	24.4	0.10	Callaway†	57	-8	25.6	T.
Edina	44	-2	18.6	1.24	Cornlea*	52	-	0.08	0.08
Farmersville	.....	.....	0.33	Grete†	55	-6	20.5	0.04	
Fayette	51	-7	22.3	0.55	Culbertson a†	50	-14	0.14	0.14
Fox Creek*1	62	-4	25.2	0.48	David City*†	49	-5	18.0	0.60
Fulton	.....	.....	0.58	Dunning*1	56	-6	25.6	T.	
Gainesville	60	-4	29.3	0.77	Ericson*1	49	-7	20.4	0.01
Gallatin*1	47	-8	18.5	Fairfield*1	54	-3	23.9	T.	
Gayoso	.....	.....	0.54	Fort Robinson	60	-14	29.4	0.44	
Glasgow†	50	-6	20.3	Fort Sidney	60	-3	30.6	0.00	
Glenstend.	.....	.....	0.60	Franklin	60	-3	27.7	T.	
Gordonville*†	2	26.8	0.73	Fremont*1	49	-6	16.9	0.28	
Gorin*2	42	-8	19.6	Genova*	.....	0.9	0.02	0.02	
Grove Dale	66	-5	29.7	0.39	Genova†	51	-9	19.4	0.19
Harrisonville†	52	-4	22.3	0.23	Gering†	60	-16	30.8	0.25
Hastain	.....	.....	0.62	Haigler*1	64	0	28.1	T.	
Hermann†	.....	.....	0.58	Hartington†	45	-14	14.4	0.61	
Houston	64	-2	29.7	0.11	Harvard*1	56	-7	23.1	0.10
Irena	.....	.....	0.52	Hay Spring†	54	-22	24.4	0.20	
Ironon†	.....	.....	0.50	Hebron†	59	-5	24.6	0.07	
Jefferson City†	62	-4	22.0	0.20	Holdrege*2	55	-5	21.7	0.09
Kidder	52	-11	17.8	0.52	Kennedy*†	52	-16	24.6	0.10
Lamar†	62	-2	26.7	0.43	Kimbball†	58	-5	31.2	0.10
Langdon†	46	-12	16.6	0.42	Lexington†	65	-6	30.4	T.
Lebanon	63	-3	26.1	0.35	Lincoln*1	52	-5	19.6	0.21
Lexington†	52	-4	22.8	0.32	Madrid*2	58	-6	27.0	T.
Liberty	49	-2	21.9	0.15	Marquette*2	51	-6	0.37	0.37
Linn Creek†	58	-3	30.0	0.20	Minden	56	-6	24.2	0.05
Louisiana Bridge†	.....	.....	0.00	Nebraska City*†	40	-9	14.9	0.00	
McCune*1	49	-9	18.7	0.85	Nesbit*2	.....	17.2	T.	0.00
Mansfield	.....	.....	0.35	Norfolk†	46	-12	16.4	0.00	
Marble Hill	61	-1	27.5	0.39	North Loup†	52*	-18	22.6	0.06
Marshall†	53	-6	20.2	Oakdale†	50	-16	17.1	0.15	
Mexico†	49	-6	19.5	O'Neill*1	48	-16	18.4	0.40	
Miami*1	46	-6	20.8	Ough b†	.....	0.10	0.10	0.10	
Mine La Motte.	61	-4	29.0	0.11	Paddock	.....	0.22 <sup>d</sup>	0.22 <sup>d</sup>	0.22 <sup>d</sup>
Mound City*†	45	-8	17.8	0.20	Palmer*1	52	-10	19.4	0.10
Mount Vernon	.....	.....	0.07	Plattsburgh†	.....	0.33	0.33	0.33	
Neosho	66	-10	30.3	0.55	Ravenne	58	-10	23.7	0.05
New Boston	46	-10	16.6	0.08	Red Cloud	.....	0.10	0.10	0.10
New Hartford	.....	.....	0.46	Santee Agency†	51	-13	17.7	0.30	
New Haven*1	60	0	24.0	Seward*3	55	-11	21.6	0.09	
New Palestine	.....	.....	0.46	Springview	54	-19	20.1	0.27	
Oakfield	59	-4	24.8	0.34	Stanton*2	65	-	16.5	0.10
Oak Ridge*2	60	0	25.6	State Farm†	46	-5	19.2	0.20	
Olden	62	0	34.2	Superior*1	54	-6	25.6	0.00	
Oregon a <sup>1</sup>	46	-9	18.2	Syracuse*1	44	-3	18.1	0.19	
Oregon b†	43	-7	18.6	Table Rock*†	44	-7	18.0	0.15	
Palmyra	.....	.....	0.65	Tekamah	45	-12	15.4	0.61	
Paris	49	-6	19.2	0.85	Theodford*1	52	-18	22.6	0.00
Phillipburg*1	61	-5	28.4	4.40	Turlington*1	44	-8	19.5	.....
Pickering†	46	-14	16.1	0.30	Wallace*1	62	-6	31.0	0.00
Platte River*3	48	-4	18.7	0.30	Weeping Water*1	44	-15	14.0	0.10
Poplar Bluff	61	4	32.1	0.28	West Point†	44	-13	13.5	0.20
Princeton <sup>1</sup>	46	-12	15.3	0.35	Whitman*1	50	-10	24.3	0.00

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Nebraska—Cont'd.	0	0	0	Ins.	Nebraska—Cont'd.	0	0	0	Ins.
Wilcox a	42	-6	15.4	0.20	Wilcox a	52	0	22.3	0.02
York*1	52	-	22.3	0.00	York*1	52	0	22.3	0.00
Nevada.	.....								

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'tn.	Stations.	Temperature. (Fahrenheit.)			Precip'tn.
	Max.	Min.	Mean			Max.	Min.	Mean	
New York—Cont'd.	0	0	0	Ins.	N. Dakota—Cont'd.	0	0	0	Ins.
Malone	46	-21	7.2	1.66	Willow City <sup>f</sup>	35	-48	-3.4	2.22
Middletown <sup>1</sup>	46	-6	17.1	3.28	Woodbridge <sup>f</sup>	32	-45	-6.0	0.55
Minnewaska <sup>1</sup>	40	-5	15.6	3.45	Yule <sup>f</sup>	46	-34	15.8	0.56
Mount Morris	50	-10	18.3	.....	Ohio.	.....	.....	.....	.....
Newark Valley	.....	.....	1.40	.....	Anapolis	.....	1.98	.....	.....
Newfield Summit	43	-8	15.0	.....	Ashland <sup>1</sup>	48	-9	16.8	4.11
New Lisbon	45	-13	15.4	1.65	Auburn	48	-14	16.0	2.46
N'th Hammond <sup>1</sup>	42	-20	9.8	2.28	Belleview	48	-12	15.5	1.90
Number Four <sup>f</sup>	41	-21	9.1	2.46	Bennet <sup>1</sup>	46	-10	14.6	3.03
Ogdensburg <sup>1</sup>	42	-13	8.1	2.93	Benton Ridge	51 <sup>b</sup>	-15 <sup>a</sup>	19.28	3.17
Oxford	43	-15	14.3	2.57	Bethany	.....	4.09	.....	.....
Palermo <sup>f</sup>	43	-9	14.4	3.07	Big Prairie <sup>1</sup>	.....	9	12.6	1.60
Perry City <sup>1</sup>	44	-14	15.6	1.75	Bissell	.....	.....	2.27	.....
Phoenix	.....	.....	2.49	.....	Bloom Center	58 <sup>a</sup>	-18 <sup>b</sup>	21.0	1.40
Plattsburg Bks	43	-15	8.8	0.89	Caledonia <sup>f</sup>	.....	2.81	.....	.....
Port Jervis	45	-12	16.9	3.57	Cambridge	51	-17	17.8	2.32
Potsdam <sup>1</sup>	45	-19	7.8	1.07	Campbellstown <sup>1</sup>	44	-16	16.6	3.69
Poughkeepsie	51	-19	15.7	2.35	Camp Dennison	.....	.....	3.21	.....
Quaker Street	43	-11	12.8	1.75	Canton <sup>1</sup>	.....	.....	3.36	.....
Rome	44	-19	13.4	.....	Cardington	.....	1.89	.....	.....
Romulus	45	-5	17.9	1.10	Carrollton	53	-11	18.3	2.45
Rondout <sup>f</sup>	42	-7	17.5	5.63	Cedarville	.....	1.76	.....	.....
Schodack Depot	.....	.....	1.78	.....	Cherry Fork	.....	2.86	.....	.....
Setauket <sup>f</sup>	53	2	23.6	3.09	Chicago	.....	2.06	.....	.....
South Canisteo <sup>1</sup>	50	-12	15.2	2.95	Circleville <sup>f</sup>	.....	1.41	.....	.....
South Kortright	48	-14	15.2	1.27	Cleveland <sup>1</sup>	52	-6	18.6	2.75
Turin	40	-20	10.1	3.78	Coatlon <sup>1</sup>	52	-13	24.0	1.83
Utica	45	-15	15.1	1.92	Colebrook	.....	.....	2.36	.....
Victor	50	-6	17.4	1.30	Demos	54	-9	19.4	2.67
Wappingers Falls	.....	.....	3.10	.....	Ellsworth	.....	1.00	.....	.....
Watertown	44	-15	12.9	3.35	Elyria	50	-8	17.3	1.86
Wedgewood <sup>1</sup>	47	-9	15.0	2.23	Frankfort	.....	3.00	.....	.....
West Chazy	.....	.....	1.05	Garrettsville <sup>1</sup>	50	-15	15.4	2.99	
West Point <sup>f</sup>	57	-8	19.4	4.43	Gratiot	52	-17	18.4	2.05
Willets Point	50	-6	21.2	2.90	Greenfield	52	-15	20.3	1.62
North Carolina.	.....	.....	.....	Green Hill	.....	2.24	.....	.....	
Asheville <sup>f</sup>	65	-9	27.2	3.29	Hackney	.....	3.04	.....	.....
Auburn	.....	.....	2.71	Hedges	48 <sup>f</sup>	21 <sup>f</sup>	13.8 <sup>f</sup>	.....	
Bailey	.....	.....	2.22	Hillhouse	.....	2.26	.....	.....	
Bakersville <sup>f</sup>	63	-17	24.4	3.70	Hillsboro	.....	2.51	.....	.....
Blowing Rock <sup>f</sup>	50	-7	25.0	1.05	Jacksonboro <sup>1</sup>	54	-17	17.7	3.90
Bryson City <sup>f</sup>	.....	.....	3.16	Kenton <sup>1</sup>	51	-16	16.8	2.71	
Chapel Hill <sup>f</sup>	66	-1	30.0	3.94	Killbuck	.....	2.29	.....	.....
Columbus	60	0	29.9	5.54	Leipac	58	-16	18.2	1.91
Currituck Inlet	.....	.....	3.46	Levering	.....	3.02	.....	.....	
Douglas	63	-8	23.4	4.53	Lordatown <sup>1</sup>	52	-9	16.6	2.32
Experiment Farm	63	2	30.6	3.85	Lowell	.....	3.06	.....	.....
Fayetteville <sup>f</sup>	.....	.....	3.15	McLuney	53	24	17.9	1.91	
Flat Rock <sup>1</sup>	64	-10	26.7	2.30	Mansfield	.....	3.30	.....	.....
Highlands <sup>1</sup>	54	-7	24.0	7.13	Marietta <sup>a</sup> <sup>f</sup>	.....	3.00	.....	.....
Horse Cove <sup>f</sup>	59	-3	26.9	5.17	Milfordton <sup>1</sup>	48 <sup>f</sup>	-8 <sup>f</sup>	17.5 <sup>f</sup>	2.68
Lenoir <sup>1</sup>	58	-15	27.3	2.31	Montville	.....	2.86	.....	.....
Lewiston	.....	.....	2.63	New Berlin	.....	0.94	.....	.....	
Lillington <sup>f</sup>	.....	.....	2.36	New Holland	57	-18	17.4	2.33	
Littleton <sup>f</sup>	61	-4	27.6	3.30	North Lewisburg <sup>1</sup>	52	-14	18.9	4.50
Louisburg <sup>1</sup>	60	-5	29.4	4.77	North Royalton	52	-14	18.9	1.70
Lynn <sup>1</sup>	65	-1	25.9	1.34	Orangeville	50	-18	15.9	2.90
Marion	61	-10	29.7	4.25	Pataskala	58	-15	17.6	2.14
Mary	55	-1	26.4	.....	Plattsburg	51	-20	15.4	1.79
Morganton <sup>1</sup>	55	-1	26.4	.....	Portsmouth <sup>a</sup> <sup>f</sup>	.....	1.95	.....	.....
Mount Airy <sup>f</sup>	62	-15	26.2	2.32	Ridgeville Corners	49	-12	15.4	2.21
Mount Holly <sup>1</sup>	.....	.....	3.10	Rittman	.....	2.05	.....	.....	
Mount Pleasant <sup>1</sup>	64	-4	29.9	2.33	Sharon Center	.....	2.06	.....	.....
Murphy <sup>f</sup>	.....	.....	2.69	Sidney <sup>f</sup>	.....	2.86	.....	.....	
Newbern <sup>f</sup>	66	6	32.0	3.08	Springboro <sup>1</sup>	56	-16	21.4	2.24
Oak Ridge <sup>1</sup>	63	-5	29.2	1.86	Strongsville	.....	1.44	.....	.....
Pittsboro	61	5	28.0	3.75	Thurman	58	-18	22.6	2.13
Raleigh <sup>1</sup>	63	3	32.4	3.22	Tiffin <sup>f</sup>	48	-9	18.2	2.28
Rockingham <sup>f</sup>	70	-3	35.7	1.58	Tyrone	.....	1.24	.....	.....
Roxbury <sup>f</sup>	69	0	39.7	2.27	Van Wert	48	-24	14.6	2.16
Salisbury <sup>1</sup>	60	6	33.0	1.93	Warren	.....	1.89	.....	.....
Saxon <sup>f</sup>	62	-8	26.8	2.25	Wauseon <sup>1</sup>	49	-15	13.8	2.47
Smithfield	65	-5	29.9	2.09	Weymouth	50	-17	14.9	3.35
Soapstone M't <sup>f</sup>	65	-9	28.7	3.33	Wheeler <sup>f</sup>	.....	17.4	2.95	.....
Southern Pines <sup>f</sup>	66	6	33.7	2.75	Zanesville <sup>f</sup>	51	-9	16.7	1.42
Tarboro	69	1	31.3	2.99	Oklahoma Ter.	.....	.....	.....	.....
Weldon <sup>f</sup>	64	-9	26.2	2.30	Anadarko <sup>f</sup>	73	-6	38.8	0.35
Willeyton	67	-3	29.8	2.26	Burnett <sup>f</sup>	71	7	36.5	0.73
North Dakota.	.....	.....	.....	Fort Reno <sup>f</sup>	75	4	40.2	0.30	
Ashley <sup>f</sup>	40	-35	3.4	0.60	Fort Sill	74	5	39.0	2.95
Bottineau <sup>f</sup>	34	-40	3.0	0.20	Gate City <sup>f</sup>	76	11	40	T
Church Ferry <sup>f</sup>	33	-36	-2.4	1.30	Guthrie <sup>f</sup>	70	0	38.8	0.34
Dickinson <sup>f</sup>	40	-47	9.2	0.86	Koekuk Falls <sup>f</sup>	71	-5	35.1	0.34
Ellendale <sup>f</sup>	41	-41	5.4	1.72	Mangum <sup>f</sup>	78	15	43.6	0.25
Fargo <sup>f</sup>	38	-38	3.0	0.57	Ponca <sup>f</sup>	67	-2	31.4	0.78
Forman <sup>f</sup>	49	-38	7.3	0.57	Sac & Fox Agency <sup>f</sup>	73	-3	37.1	0.50
Fort Stevenson <sup>f</sup>	38	-48	5.0	0.73	Stillwater <sup>f</sup>	78	0	33.9	0.52
Fort Yates	44	-28	10.2	2.54	Winnview <sup>f</sup>	74	6	35.6	0.71
Gallatin <sup>f</sup>	32	-44	0.0	0.29	Oregon.	.....	.....	.....	.....
Grafton <sup>f</sup>	34	-33	-4.6	1.75	Albany <sup>a</sup> <sup>f</sup>	51	8	32.9	2.31
Grand Forks <sup>1</sup>	34	-32	-3.8	1.70	Albany <sup>b</sup>	52	20	31.8	2.79
Grand Rapids <sup>f</sup>	40	-34	2.0	0.59	Point Pleasant	55	-9	30.8	2.05
Kelso <sup>f</sup>	35	-35	-1.2	0.85	Ashland <sup>a</sup>	46	17	30.8	0.55
Lakota <sup>f</sup>	40	-44	1.5	1.37	Ashland <sup>b</sup>	52	17	32.1	0.76
Mayville <sup>f</sup>	35	.....	1.00	Aurora <sup>a</sup>	52	20	37.2	1.33	
Medora <sup>f</sup>	52	-37	15.7	Aurora <sup>b</sup>	53	14	33.5	1.69	
Milton <sup>f</sup>	30	-35	-4.2	1.00	Bake Oven <sup>f</sup>	55	-9	25.3	0.78
Minto <sup>f</sup>	30 <sup>b</sup>	-40 <sup>a</sup>	-4.3	.....	Beulah <sup>f</sup>	50	-9	22.2	1.50
Napoleon <sup>f</sup>	39	-35	1.4	0.79	Brownsville <sup>1</sup>	52	14	33.4	1.46
Power <sup>f</sup>	38	-32	-0.4	0.42	Canyon City <sup>f</sup>	65	8	36.0	0.70
Reynolds <sup>f</sup>	33	-38	-1.8	.....	Comstock <sup>1</sup>	50	18	35.9	1.52
Saint Johns <sup>f</sup>	.....	.....	1.57	Corvalis <sup>a</sup>	51	13	32.4	2.35	
Sykeson <sup>f</sup>	41	-40	2.4	0.40	Corvalis <sup>b</sup>	.....	.....	.....	.....
Wahpeton <sup>f</sup>	40	-30	-0.9	0.70	Corvalis <sup>c</sup>	51	13	32.4	2.35
Wild Rice <sup>f</sup>	.....	.....	4.2	0.87	Corvalis <sup>d</sup>	.....	.....	.....	.....

## Meteorological record of voluntary observers, &amp;c.—Continued.

| Stations. | Temperature. (Fahrenheit.) | | | Precip'n. | Stations. | Temperature. (Fahrenheit.) | | | Precip'n. | Stations. |
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## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean	
Tennessee—Cont'd.	0	0	0	Ins.
Clinton f.	.....	.....	1.70	.....
Columbia f.	.....	.....	1.31	.....
Covington a f.	64	4	34.0	0.91
Dunlap f.	.....	.....	0.91	.....
Fayetteville* <sup>1</sup>	63	0	32.6	0.55
Florence Station* <sup>1</sup>	65	0	32.5	1.45
Franklin f.	67	-4	31.6	1.50
Greeneville* <sup>1</sup>	60	-20	25.6	2.02
Hohenwald* <sup>1</sup>	68	6	33.3	1.07
Jacksboro* <sup>1</sup>	58	-10	24.8	2.47
Jackson* <sup>1</sup>	65	-3	33.5	.....
Johnsonville f.	.....	.....	1.18	.....
Kingston f.	.....	.....	1.86	.....
Lookout Mountn* <sup>1</sup>	60	3	30.4	2.16
Loudon f.	.....	.....	1.81	.....
Lynnville* <sup>1</sup>	65	5	32.2	0.65
Missionary Ridge* <sup>2</sup>	7	31.8	.....	.....
Newport* <sup>3</sup>	66	-18	23.5	1.88
Nunnelly* <sup>1</sup>	66	-5	33.8	0.93
Parksville* <sup>1</sup>	67	4	34.8	1.65
Riddleton f.	64	-4	30.2	1.49
Rockwood f.	.....	.....	1.80	.....
Rogersville* <sup>1</sup>	57	-13	25.1	1.82
Rugby* <sup>1</sup>	60	9	28.0	2.28
Savannah* <sup>1</sup>	65	-4	35.7	0.75
Springdale* <sup>1</sup>	64	-20	25.0	3.20
Sweetwater f.	67	5	33.0	0.62
Tazewell f.	.....	.....	.....	.....
Waynesboro* <sup>1</sup>	60	-2	31.8	0.20
Texas.	.....	.....	.....	.....
Albany* <sup>1</sup>	80	23	45.6	0.40
Alice f.	83 <sup>b</sup>	29 <sup>b</sup>	60.2 <sup>b</sup>	3.31
Arlington f.	75	19	45.5	0.51
Arthur City f.	.....	.....	1.03	.....
Aurora* <sup>1</sup>	80	17	46.8	0.56
Austin a f.	79	22	47.8	0.45
Austinb* <sup>1</sup>	75	25	51.8	.....
Boerne* <sup>1</sup>	22	45.3	0.21	.....
Brady f.	76 <sup>b</sup>	68 <sup>b</sup>	44.6 <sup>b</sup>	0.39
Brazoria f.	77	26	54.4	1.46
Brenham f.	79	27	53.0	0.50
Brownwood f.	78	16	45.9	1.00
Burnet* <sup>1</sup>	72	22	49.2	0.10
Camp Eagle Pass.	80	22	50.2	1.11
Camp P. Colorado.	73	1	41.3	0.00
Childress f.	75	13	39.4	0.30
Coldwater f.	71 <sup>d</sup>	9 <sup>d</sup>	37.8 <sup>d</sup>	0.20
College Station.	80	25	53.2	0.80
Columbu f.	78	27	53.6	0.35
Corsicana b f.	70	19	43.4	1.09
Cuero b f.	88	26	54.4	0.91
Dallas B* <sup>1</sup>	76	19	43.7	0.38
Devine.	79	21	50.7	T.
Durham f.	.....	.....	0.05	.....
Duval* <sup>1</sup>	80	24	41.6	T.
Eagle Pass.	.....	.....	0.97	.....
Eastland* <sup>1</sup>	75	15	45.9	0.10
Flower Bluff.	76	33	59.6	3.24
Forestburg f.	74	14	44.9	0.52
Fort Brown f.	.....	27	.....	3.87
Fort Clark.	77	23	52.6	0.02
Fort Hancock.	78	3	39.2	T.
Fort McIntosh.	84	24	55.2	1.00
Fort Ringgold.	80	26	56.9	2.49
Fredericksburg* <sup>1</sup>	74	22	48.7	0.24
Gainesville f.	76	16	42.9	0.81
Graham f.	72	19	44.7	0.64
Grape Vine f.	70	15	44.4	0.81
Hallettsville f.	78	21	50.0	0.10
Hartley f.	67	7	37.1	0.20
Haskell* <sup>1</sup>	76	20	43.0	0.05
Hidalgo f.	.....	.....	5.41	.....
Highland.	83	13	46.7	1.00
Houston f.	74	29	51.4	0.65
Huntsville f.	72	36	51.6	1.20
Kent.	.....	.....	0.15	.....
Laredo f.	.....	.....	2.03	.....
Llano* <sup>1</sup>	78	23	55.2	0.01
Luling f.	78	20	51.8	0.00
McGregor f.	70	20	38.7	1.00
Menardville* <sup>1</sup>	74	14	45.0	0.21
Mesquite f.	75	18	44.4	0.93
Mountain Spring f.	78	15	45.0	1.00
New Braunfels f.	75	26	51.1	0.11
Ochiltree f.	.....	.....	0.20	.....
Orange f.	.....	.....	1.65	.....
Paris f.	.....	.....	2.50	.....
Quanah f.	76	9	41.4	.....
Rio Grande City f.	.....	.....	2.34	.....
Roby f.	73 <sup>e</sup>	16 <sup>e</sup>	43.4 <sup>e</sup>	0.30
Rockport* <sup>1</sup>	74	30	52.4	.....
Round Rock f.	75	20	51.6	0.20
San Antonio b.	78	26	52.8	0.11
Sierra Blanca a f.	70	14	44.2	.....
Silver Falls f.	72	10	43.2	0.75
Sulphur Springs f.	76	12	44.3	0.87
Twohig f.	87 <sup>e</sup>	27 <sup>e</sup>	55.6 <sup>e</sup>	2.10
Victoria* <sup>1</sup>	77 <sup>e</sup>	28 <sup>e</sup>	55.2 <sup>e</sup>	0.78
Waco f.	74	24	48.7	1.80
Utah.	.....	.....	.....	.....
Beaver f.	60	-4	27.5	0.45
Blue Creek* <sup>1</sup>	45	-3	22.6	1.25
Castle Gate f.	63	7	31.4	1.43
Cisco f.	54	-10	24.4	0.50
Corinne* <sup>1</sup>	45	0	24.0	0.83

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean	
Utah—Cont'd.	8	0	0	Ins.
Deseret f.	48	-12	21.4	0.54
Fillmore f.	60	-5	30.3	0.81
Fort Du Chesne.	.....	.....	0.42	.....
Grouse Creek f.	.....	.....	1.29	.....
Heber* <sup>1</sup>	48	-12	19.6	1.80
Kelton* <sup>1</sup>	39	-6	18.8	1.20
Lake Park.	46	5	26.2	1.55
Levant* <sup>1</sup>	.....	.....	21.0	1.28
Los f.	58	-7	27.9	0.40
Logan f.	49	2	24.4	0.65
Loosee f.	60	5	34.2	0.90
Manti f.	48	-18	20.7	0.00
Mount Carmel* <sup>1</sup>	68	11	33.8	2.01
Ogden a* <sup>1</sup>	60	10	29.1	0.73
Ogden b* <sup>1</sup>	.....	.....	26.2	0.95
Parowan f.	60	5	34.0	0.84
Promontory* <sup>1</sup>	50	-8	20.7	1.30
Prov City* <sup>1</sup>	.....	.....	20.9	0.00
Richfield f.	60	-1	22.6	1.05
Saint George f.	71	14	41.2	0.77
Scofield* <sup>1</sup>	56	-23	20.6	1.80
Snowville f.	43	-7	20.2	0.90
Stockton f.	.....	.....	21.8	0.69
Terrace* <sup>1</sup>	47	-4	21.7	1.20
Vermont.	.....	.....	.....	.....
Brattleboro a.	39	-12	14.7	2.33
Burlington f.	42	-10	13.0	2.00
Chelesa* <sup>1</sup>	35	-18	5.4	1.64
Cornwall.	.....	.....	1.63	.....
Enosburg Falls f.	46	-19	9.0	1.40
Hartland f.	39	-24	5.2	2.48
Hyde Park f.	45 <sup>e</sup>	-25 <sup>e</sup>	11.4 <sup>e</sup>	.....
Irasburg f.	.....	.....	1.55	.....
Jacksonville.	42	-15	12.0	2.96
Norwich* <sup>1</sup>	40	-18	10.1	1.34
Saxtons River <sup>1</sup>	42	-18	9.7	2.42
Simonsville.	38	-14	9.8	1.00
South Royalton* <sup>1</sup>	45	-20	8.2	1.16
Strafford* <sup>1</sup>	39	-14	9.4	1.90
Vernon* <sup>1</sup>	36	-17	9.0	3.77
Wells.	44	-15	10.0	1.56
Woodstock.	41	-28	7.0	1.66
Virginia.	.....	.....	.....	.....
Abingdon f.	.....	.....	2.63	.....
Ashland f.	77	-16	25.5	2.88
Avon f.	70	-2	26.4	3.93
Bedford City f.	60	-1	27.2	1.35
Cumberland f.	30	-20	20.0	3.35
Delavan (near) f.	40	-24	7.0	1.26
Depere.	32	-26	6.3	2.58
Eau Claire a.	28	-29	4.2	1.31
Elmwood f.	35	-35	2.2	0.53
Field.	35	-17	6.6	1.23
Bayfield.	35	-20	8.8	1.26
Beaver Dam.	30	-19	8.8	1.26
Beloit f.	32	-20	8.4	1.18
Black River Falls f.	26	-30	3.4	1.38
Butternut f.	28	-35	1.0	0.44
Cadiz* <sup>1</sup>	24	-24	4.7	1.26
Centralia.	29	-33	4.6	0.90
Chippewa Falls f.	30	-29	7.7	1.53
Columbus.	35 <sup>e</sup>	-24 <sup>e</sup>	6.0 <sup>e</sup>	2.45
Crandon f.	31	-32	3.0	1.74
Cumberland f.	30 <sup>b</sup>	-20 <sup>b</sup>	6.2 <sup>b</sup>	.....
Delavan (near) f.	40	-24	7.0	1.26
Depere.	32	-26	6.3	2.58
Eau Claire a.	28	-29	4.2	1.31
Fond du Lac* <sup>1</sup>	30	-29	7.7	1.07
Grantsburg f.	40	-16	6.4	1.40
Hammond f.	31	-24	5.4	1.70
Harvey f.	32	-19	6.9	1.39
Hillboro.	32	-32	3.4	1.70
Hudson.	34	-28	6.4	1.80
Janesville.	34	-16	8.4	1.63
Juneau f.	30	-26	6.2	1.65
Virginia.	.....	.....	.....	.....
Washington.	.....	.....	1.82	.....
Aberdeen f.	53	10	37.0	3.05
Centralia.	55	2	35.6	2.57
Chehalis f.	57	3	36.8	1.74
Colfax f.	56	-14	27.5	1.15
East Sound f.	52	-6	35.8	1.95
Ellensburg f.	45	-10	21.6	0.19
Ferry f.	.....	.....	1.58	.....
Fort Simcoe.	54	-11	24.8	1.00
Fort Spokane.	47	-24	21.2	1.76
Fort Townsend.	55	-3	35.5	1.65
Madrone f.	54	0	37.0	2.90
Moxee Valley f.	46	-13	22.0	0.60
Olga f.	53	-3	35.8	2.04
Pine Hill f.	50	-9	26.8	1.

\*Extremes of temperature from observed readings of dry thermometer.

†Weather Bureau instruments.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

1 Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. + 4.

2 Mean of 8 a. m. + 8 p. m. + 2.

3 Mean of 7 a. m. + 7 p. m. + 2.

4 Mean of 6 a. m. + 6 p. m. + 2.

5 Mean of 7 a. m. + 2 p. m. + 2.

6 Mean from readings at various hours reduced to true daily mean by special tables.

7 Mean from hourly readings of thermograph.

8 Mean of 7 a. m. + 2 p. m. + 9 p. m. + 3.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An Italic letter following the name of a station, as "Livingston a," "Livingston b," indicates that two or more observers, as the case may be, are reporting from the same station. A small Roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record, for instance, "a" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

Corrections: California, Stockton *b*, December, 1892, make precipitation 5.70 instead of 9.39. California, King City, November, 1892, make minimum temperature 28 instead of 26. California, Glen Ellen, October, 1892, make minimum temperature 34 instead of 24. Colorado, Hugo, from October, 1891, to December, 1892, inclusive, should read Hugo (near). Michigan, Arbuta, from February, 1892, to December, 1892, inclusive, cut out all maximum and minimum temperatures.

NOTE.—The following changes have been made in names of stations: Georgia, Statesboro, changed to Brag. Louisiana, North Louisiana Experimental Station, changed to Calhoun. Massachusetts, Ludlow *a*, changed to Ludlow Center. Missouri, Jerome, changed to Arlington. Texas, Red River City, changed to Colbert, Ind. T.

NOTE.—Reports from stations in the above table followed by the numeral "a" are furnished by the Southern Pacific Railway Company, the mean temperatures of which have always been computed by the formula  $\frac{1}{4}(7 \text{ a. m.} + 2 \text{ p. m.} + 9 \text{ p. m.})$ , but heretofore published in the REVIEW as being obtained by the formula  $\frac{1}{4}(7 \text{ a. m.} + 2 \text{ p. m.} + 9 \text{ p. m.})$ .

Data from Canadian stations for the month of January, 1893.

Station.	Pressure.			Temperature.			Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.	Prevailing direction of wind.	
Saint Johns, N. F.	Inches.	Inches.	Inches.	°	°	Inches.	Inches.	w.	
Sydney, C. B. I.	29.64	29.79	+ .06	27.6	+ 4.0	9.44	.....	w.	
Halifax, N. S.	29.70	29.84	- .19	20.4	- 0.6	4.78	- 0.91	w.	
Grand Manan, N. B.	29.80	29.85	.....	18.1	.....	3.19	- 2.18	nw.	

Data from Canadian stations—Continued.

Station.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.	
Yarmouth, N. S.	Inches.	Inches.	Inches.	°	°	Inches.	Inches.	n.
Saint Andrews, N. B.	29.76	29.84	- .18	22.8	- 2.7	4.99	- 0.23	nw.
Charlottetown, P. E. I.	29.78	29.83	.....	13.6	.....	2.46	- 0.84	w.
Chatham, N. B.	29.75	29.79	.....	15.0	.....	2.91	- 0.50	w.
Father Point, Que.	29.82	29.82	- .20	5.6	- 0.4	3.29	+ 0.01	se.
Quebec, Que.	29.58	29.95	- .11	3.6	- 3.4	1.89	- 1.78	w.
Montreal, Que.	29.58	29.95	.....	.....	.....	.....	.....	.....
Rockliffe, Ont.	29.38	29.94	- .13	- 2.5	- 6.0	2.10	+ 0.09	se.
Kingston, Ont.	29.60	29.94	- .14	9.1	- 5.9	2.92	- 0.34	ne.
Toronto, Ont.	29.54	29.95	- .15	13.3	- 5.7	2.80	+ 0.29	w.
White River, Ont.	28.55	30.07	.....	- 11.8	.....	0.14	.....	n.
Port Stanley, Ont.	29.28	29.97	.....	13.8	.....	4.70	+ 2.02	w.
Saugeen, Ont.	29.20	29.97	- .09	13.4	- 5.1	6.11	+ 2.65	s.
Parry Sound, Ont.	29.19	29.95	- .13	4.1	- 7.4	4.15	+ 1.00	n.
Port Arthur, Ont.	29.24	30.01	- .09	- 2.0	- 2.5	1.36	+ 0.55	nw.
Winnipeg, Man.	29.21	30.14	- .04	- 10.0	+ 1.0	1.88	+ 1.22	n.
Minnedosa, Man.	28.12	30.12	- .04	- 5.4	+ 6.1	1.01	+ 0.38	nw.
Qu'Appelle, Assiniboina.	27.68	30.15	- .01	- 1.5	+ 6.5	0.51	+ 0.13	w.
Medicine Hat, Assiniboina	27.67	30.13	- .05	12.6	+ 11.1	1.72	+ 1.39	w.
Swift Current, Assiniboina	27.49	30.17	- .01	7.3	+ 9.3	1.34	+ 0.73	w.
Calgary, Alberta.	26.39	30.13	- .05	14.7	+ 11.2	0.55	- 0.02	n.
Prince Albert, Saskatchewan	29.36	30.24	.....	31.6	.....	0.32	.....	e.
Spencer Bridge, B. C.	27.62	30.11	+ .03	11.3	+ 1.5	1.43	+ 0.70	sw.
Edmonton, Alberta.	29.87	30.03	- .14	60.4	.....	6.74	.....	nw.
Battleford, Saskatchewan	29.87	30.03	- .14	60.4	.....	6.74	.....	.....
Grindstone, Gulf St. L.	29.87	30.03	- .14	60.4	.....	6.74	.....	.....
Hamilton, Bermuda.	29.87	30.03	- .14	60.4	.....	6.74	.....	.....
November, 1892.	29.96	30.12	.....	66.8	.....	7.48	.....	sw.
Hamilton, Bermuda.	29.88	30.04	.....	62.5	.....	3.17	.....	dw.
December, 1892.	29.66	29.69	.....	23.6	.....	.....	.....	dw.
Hamilton, Bermuda.	29.66	29.69	.....	23.6	.....	.....	.....	dw.
Sandy Point.	29.66	29.69	.....	23.6	.....	.....	.....	dw.

*Table of miscellaneous meteorological data for January, 1893—Weather Bureau observations.*

Districts and stations.	Elevation above sea-level, feet.	Length of record.	Pressure, in inches.	Temperature of the air, in degrees Fahrenheit.								Humidity and precipitation.								Wind.				Mean temperature data since opening of station.											
				Mean pressure, 8 a.m. and 8 p.m. + 2.		Mean reduced.		Departure from normal.		Mean maximum.		Mean minimum.		Greatest daily range.		Mean temperature of the dew-point.		Precipitation, in inches.		Departure from normal.		Days with 0.1 or more.		Total movement, miles.		Prevailing direction.		Maximum velocity.		Cloudless days.					
				Date.	Maximum.	Date.	Minimum.	Date.	Mean maximum.	Date.	Mean minimum.	Date.	Mean maximum.	Date.	Mean minimum.	Date.	Mean maximum.	Date.	Mean minimum.	Date.	Mean maximum.	Date.	Mean minimum.	Date.	Mean maximum.	Date.	Mean minimum.	Date.	Partly cloudy days.	Cloudy days.	Average cloudiness, teeth.	Highest for month.	Lowest for month.		
<i>New England.</i>				20.6	-7.1				15.6	-4.7	50	2	22	-6	13	9	27	6	66	2.56	-1.6	14	9,696	NW.	48	se.	10	6	15	10	6.4	28.0	1880	13.1	1875
Eastport	53	20	29.79	29.85	-15	15.6	-4.7	50	2	22	-5	17	8	27	8	74	2.19	-1.3	12	5,772	N.	26	NW.	6	8	10	13	5.8	32.3	1880	14.3	1888			
Portland	103	22	29.78	29.89	-16	15.2	-4.9	48	2	22	-5	17	7	32	8	74	2.30	-1.3	13	4,620	NW.	28	NW.	7	13	8	10	5.9	29.9	1888	14.2	1888			
Manchester	247	6	29.65	29.93	-10	15.4	-4.5	52	2	24	-9	11	7	32	8	74	1.78	-1.6	8	5,599	s.	42	sw.	2	3	13	15	5.6	23.7	1889	5.7	1889			
Northfield	872	6	29.95	29.97	-10	5.7	-7.1	45	29	16	-26	4	-4	34	1	74	2.51	-1.6	12	9,620	W.	52	s.	2	12	7	12	5.3	35.5	1889	20.0	1889			
Boston	125	23	29.79	29.93	-14	20.7	-4.7	53	2	28	-4	11	13	29	13	71	2.06	-1.8	13	9,443	NW.	45	ne.	6	13	2	16	6.3	37.7	1889	23.8	1893			
Nantucket	14	7	29.91	29.92	-14	23.8	-7.1	44	29	20	-11	18	18	25	18	76	2.06	-1.8	13	9,443	NW.	45	ne.	3	12	6	13	5.4	38.8	1888	21.6	1893			
Woods Hole	16	7	29.91	29.92	-14	21.6	-9.7	53	2	28	-5	17	15	26	17	3.53	+ 0.1	14	11,678	NW.	60	se.	2	12	3	16	3.9	35.9	1890	24.9	1893				
Vineyard Haven	7	7	29.91	29.94	-15	24.9	-10.1	52	2	33	-2	11	17	27	17	1.61	-1.9	5	5,485	NW.	70	ne.	6	10	14	7	5.3	37.0	1890	23.7	1893				
Block Island	27	13	29.91	29.94	-15	23.7	-7.5	52	1	29	-2	11	18	24	17	74	2.65	-1.8	13	13,485	NW.	70	ne.	1	12	3	10	3.0	36.0	1890	19.8	1893			
Narragansett Pier	11	11	29.87	29.97	-10	19.8	-7.3	50	2	28	-4	11	11	34	13	2.97	-2.8	13	5,847	NW.	47	nw.	1	12	9	10	5.2	37.5	1880	20.2	1893				
New Haven	107	21	29.82	29.94	-18	20.2	-6.8	53	2	28	-3	18	13	28	12	3.47	-0.7	17	6,828	n.	37	se.	1	12	9	10	5.4	37.7	1880	21.0	1893				
New London	47	23	29.88	29.93	-17	21.0	-8.5	50	1	28	-4	11	14	29	13	73	2.46	-1.6	13	5,334	NW.	50	se.	1	11	10	10	5.4	37.7	1880	21.0	1893			
<i>Mid. Atlantic States.</i>				24.7	-9.0																														
Albany	85	20	29.87	29.97	-13	16.8	-7.4	52	2	24	-5	11	10	23	12	84	1.31	-1.5	10	6,057	NW.	26	se.	9	3	16	12	6.5	31.0	1880	14.5	1875			
New York, N. Y.	185	23	29.77	29.98	-14	17.6	-5.6	52	1	29	1	11	17	25	15	71	3.50	-0.3	12	8,815	NW.	45	se.	1	12	6	11	6.0	40.2	1890	23.3	1893			
Harrisburg	377	5	29.58	30.02	-10	21.0	-0.5	45	26	27	-4	16	15	21	14	75	2.05	-0.8	8	6,542	NW.	41	nw.	25	6	14	11	5.7	38.0	1890	21.0	1893			
Philadelphia	117	23	29.87	30.00	-16	24.0	-8.5	53	1	30	0	16	18	25	18	79	2.58	-0.8	13	7,894	NW.	36	se.	1	10	10	11	5.6	41.8	1890	24.0	1893			
Atlantic City	53	20	29.94	29.99	-14	22.9	-9.4	51	1	30	0	16	16	23	19	85	2.67	-1.1	9	8,837	NW.	47	nw.	6	9	15	7	5.2	42.1	1890	22.9	1893			
New Brunswick																																			
Baltimore	179	23	29.81	30.01	-15	24.6	-9.7	52	2	26	31	1	16	18	24	17	76	1.78	-1.4	8	6,510	NW.	39	nw.	10	13	6	8	5.0	44.0	1890	24.6	1893		
Washington, D. C.	112	23	29.91	30.04	-14	24.6	-8.0	57	2	27	33	-6	18	16	32	15	71	1.85	-1.5	10	5,549	NW.	36	nw.	10	12	10	9	4.9	43.8	1890	24.6	1893		
Cape Henry	20	23	29.94	30.06	-11	29.4	-10.3	53	2	27	37	6	17	22	38	18	1.65	-3.0	9	5,490	NW.	41	sw.	15	8	8	8	5.1	38.0	1890	24.9	1893			
Lynchburg	685	22	29.28	30.06	-11	26.0	-10.3	64	2	27	36	-6	17	17	36	18	76	1.99	-2.2	10	3,462	NW.	25	dw.	10	11	13	7	4.9	47.2	1890	26.6	1893		
Norfolk	57	23	29.97	30.04	-12	30.4	-10.1	67	2	27	39	6	17	22	33	23	79	2.55	-1.3	11	5,247	NW.	36	dw.	6	12	9	10	5.2	51.2	1890	30.4	1893		
<i>S. Atlantic States.</i>																																			
Charlotte	773	15	29.20	30.06	-12	32.6	-8.6	67	2	28	42	5	16	24	34	20	64	2.43	-2.9	8	5,120	SW.	48	sw.	1	14	11	11	4.6	4.0	32.6	1890	32.6	1893	
Hatteras	11	13	30.04	30.05	-11	30.5	-9.1	68	2	28	43	16	11	30	27	30	79	3.43	-2.6	10	10,817	n.	49	se.	1	13	8	10	5.0	55.5	1890	36.5	1893		
Kittyhawk	9	18	30.00	30.01	-11	16.2	-32.1	10.1	64	29	39	9	11	25	45	27	84	2.17	-3.6	13	9,761	NW.	52	ne.	19	18	6	7	3.8	55.5	1890	32.1	1893		
Raleigh	388	7	29.62	30.06	-12	30.8	-10.7	65	2	28	40	21	21	34	23	74	3.79	+ 0.1	9	4,608	NW.	28	sw.	6	13	6	12	5.2	51.1	1890	30.8	1893			
Southport	34	18	30.01	30.04	-13	38.9	-5.7	64	2	29	48	11	14	30	40	29	70	3.12	-0.5	7	6,375	NW.	48	s.	1	13	12	6	4.2	5.6	1890	38.9	1893		
Wilmington	78	23	29.98	30.07	-10	39.0	-8.3	63	2	29	48	13	16	30	30	29	76	2.26	-0.7	10	6,524	NW.	42	dw.	6	18	6	7	3.5	57.2	1890	39.0	1893		
Charleston	52	23	30.04	30.09	-09	43.4	-6.5	65	2	29	47	16	26	36	28	30	66	3.22	-0.8	8	6,540	w.	35	s.	1	12	14	14	5.4	59.3	1890	42.8	1893		
Columbia	6	23	29.88	30.13	-08	35.6	-8.8	68	2	27	48	12	16	30	36	29	74	2.92	-1.6	8	5,092	w.	36	sw.	17	10	8	7	3.7	50.5	1890	38.8	1893		
Augusta	209	22	29.88	30.13	-07	37.8	-8.8	68	2	27	48	12	16	30	36	29	74	2.92	-1.6	8	5,092	w.	36	dw.	13	10	8	7	4.0	59.9	1890	44.3	1893		
Savannah	98	23	30.00	30.11	-09	44.3	-7.3	71	2	29	53	18	16	35	34	31	67	2.21	-1.3	13	6,821	NW.	34	dw.	6	12	15	15	4.0	59.9	1890	44.3	1893		
Jacksonville	43	23	30.06	30.11	-07	49.2	-6.1	72	2	27	59	24	17	39	30	34	66	0.98	-2.5	9	5,900	NW.	34	sw.	1	14	7	10	4.5	53.4	1890	49.3	1893		
<i>Florida Peninsula.</i>																																			
Jupiter	28	6	30.06	30.09	-09	60.0	-7.7	77	*	68	35	14	52	32	53	50	80	2.58	-0.8	9	7,651	NW.	33	s.	19	17	8	10	6.4	4.0	2.2	1890	60.0	1893	
Key West	22	23	30.09	30.11	-03	64.1	-6.3	78	2	28	68	52	14	60	17	57	79	2.86	+ 0.8	6	9,112	ne.	48	n.	24	12	13	13	6	4.9	74.9	1875	63.8	1886	
Marco f.																																			
Tampa	36	20	30.05	30.12	-09	55.4	-1.1	76	2	27	60	12	20	31	28	35	82	3.17	-1.8	9	5,789	N.	33	s.	15	15	10	10	6.4	4.6	2.0	1890	43.5	1884	
Titusville	44	6	30.08	30.12	-09	53.2	-4.5	75	2	27	62	19	14	44	33	45	79	2.80	-2.5	11	9,192	NW.	37	sw.	5	14	13	13	4	3	9.6	44.4	1890	53.2	1893
<i>Eastern Gulf States.</i>																																			
Atlanta	1,131	15	28.87	30.12	-09	35.6	-6.5</																												

Table of miscellaneous meteorological data for January, 1893—Weather Bureau observations—Continued.

Districts and stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure, in inches.		Temperature of the air, in degrees Fahrenheit.						Humidity and precipitation.				Wind.				Mean temperature data since opening of station.											
			Mean pressure, s. a. m. and s. p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with '01, or more.	Total movement, miles.	Precipitation, direction.	Miles per hour.	Maximum velocity.	Cloudless days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Highest for month.	Lowest for month.	Year.
			Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	
<i>E. Northwest—Con.</i>																														
Fort Buford	1,899	15	27.98	30.17	- .00	6.8 + 5.2	42	3	16	-38	31	- 2	34	4	84	2.04 + 1.5	18	6,477	nw.	48	nw.	11	16	5	23	8.1	21.2	1891	- 5.6	1888
<i>Upper Miss. Valley.</i>																														
Minneapolis																														
Red Wing	75	20	30.10	30.10	0.00	3.2 + 5.4	34	8	12	-26	14	- 6	42	- 5	66	0.92 + 1.1	13	6,540	w.	42	w.	31	10	7	14	6.0	26.2	1880	- 0.9	1888
Saint Paul	850	23	29.10	30.11	- .04	3.2 + 6.8	33	8	11	-23	15	- 5	39	- 2	74	0.73 + 0.3	13	5,746	nw.	36	n.	5	9	13	6.1	26.2	1880	2.6	1888	
La Crosse	720	21	29.23	30.09	- .04	5.8 + 7.7	32	8	14	-26	14	- 2	35	0	76	1.10 + 0.2	12	4,693	n.	35	n.	9	7	9	15	6.7	31.2	1880	9.1	1883
Davenport	613	22	29.39	30.11	- .04	9.1 + 10.0	39	24	17	-15	13	- 2	33	4	79	1.14 + 0.6	14	7,838	w.	38	n.	5	10	14	6.2	37.6	1880	9.1	1883	
Des Moines	869	15	29.12	30.14	- .04	10.2 + 6.5	42	24	19	-14	13	- 2	35	5	80	0.56 + 0.8	10	6,196	nw.	37	n.	5	12	8	11	5.3	35.2	1880	6.9	1888
Dubuque	651	20	29.31	30.08	- .05	6.6 + 9.9	37	8	14	-23	17	- 1	40	1	77	1.60 + 0.1	11	3,988	nw.	26	n.	8	11	12	5.7	34.2	1880	6.6	*	
Keokuk	613	22	29.58	30.10	- .05	14.2 + 6.8	45	24	22	-12	13	- 6	42	9	80	0.92 + 0.8	10	5,659	nw.	25	n.	24	5	16	10	6.1	41.3	1880	13.6	1888
Cairo	359	22	29.69	30.10	- .07	29.4 + 3.6	62	28	36	0	15	21	30	24	79	1.26 + 2.9	6	6,891	nw.	36	n.	5	12	13	6	4.8	51.3	1880	25.4	1886
Springfield, Ill.	644	14	29.33	30.08	- .09	16.8 + 8.8	55	25	25	-12	15	8	32	11	76	0.65 + 1.8	12	8,026	nw.	36	n.	5	6	12	13	6.4	43.7	1880	16.8	1893
Hannibal	534	20	29.47	30.09	0.00	18.4 + 4.4	45	24	27	- 7	13	10	35	13	79	0.54 + 0.4	6	7,140	nw.	36	w.	4	14	13	6.4	44.1	1880	13.6	1888	
Saint Louis	571	23	29.42	30.06	- .06	18.1 + 6.6	60	25	33	- 2	15	16	25	17	73	0.53 + 2.1	7	9,655	nw.	40	nw.	5	14	8	9	4.7	45.7	1880	21.7	1881
<i>Missouri Valley.</i>																														
Columbia																														
Kansas City	963	5	29.04	30.14	0.00	23.0 + 3.0	49	31	31	-2	13	14	32	15	75	0.39 + 1.9	6	6,686	nw.	36	w.	10	11	10	5	0.34	1891	22.0	1893	
Springfield, Mo.	1,356	8	28.59	30.09	- .06	29.8 + 0.1	65	40	40	* 0	27	31	21	75	0.34 + 1.9	6	8,557	nw.	37	n.	5	10	11	10	5.1	39.4	1890	27.5	1886	
Leavenworth	857	23	29.17	30.16	- .04	19.8 + 2.3	50	22	30	- 2	13	13	32	14	76	0.10 + 1.2	4	7,354	nw.	42	n.	9	7	14	10	5.9	41.4	1890	14.4	1886
Topeka																														
Omaha	1,113	23	28.89	30.16	- .06	15.9 + 1.3	47	22	22	- 11	12	6	36	7	80	0.34 + 2.6	4	7,315	nw.	35	n.	9	12	13	6	5.6	32.6	1890	7.3	1886
Crete																														
Sioux City																														
Sioux City																														
Pierre	1,165	8	28.79	30.14	0.00	16.6 + 6.0	46	24	24	- 28	29	- 2	35	5	85	0.85 + 0.4	12	9,507	nw.	60	w.	31	9	11	11	5.9	24.1	1891	1.4	1888
Huron	1,470	8	28.47	30.15	- .06	15.6 + 4.4	47	24	24	- 20	31	7	43	11	84	0.77 + 1.0	10	6,694	nw.	42	n.	31	6	12	13	6.5	32.1	1890	1.1	1888
Yankton	1,232	20	28.74	30.16	- .04	14.2 + 2.3	49	6	24	- 13	20	4	39	7	73	0.52 + 0.0	10	7,588	nw.	36	n.	9	4	14	13	6.8	28.9	1890	0.5	1875
<i>Northern Slope.</i>																														
Havre	2,477	13	27.37	30.14	- .01	16.8 + 8.8	51	3	24	-43	31	10	42	11	80	1.23 + 0.2	11	7,901	sw.	52	sw.	3	6	15	10	6.1	26.6	1891	- 5.1	1890
Miles City	2,374	8	27.48	30.13	0.00	18.8 + 5.4	54	31	31	-2	13	14	32	15	75	0.55 + 1.0	6	6,732	nw.	36	w.	31	9	16	16	6.5	32.1	1890	1.1	1888
Helena	4,118	13	25.82	30.24	- .12	21.9 + 6.6	59	32	32	-27	31	15	40	7	57	1.72 + 0.4	8	5,446	sw.	48	w.	13	8	15	15	6.5	27.5	1891	5.3	1888
Rapid City	3,280	8	26.57	30.16	- .06	25.8 + 7.1	63	33	33	-21	31	15	62	13	64	0.30 + 0.0	10	7,852	nw.	48	n.	11	12	10	9	5.3	31.8	1891	10.7	1888
Cheyenne	6,105	22	23.92	30.15	- .04	31.8 + 8.0	54	55	42	0	15	21	42	15	55	0.08 + 0.2	2	9,687	nw.	54	w.	27	18	12	1	2.8	31.8	1893	13.2	1875
Lander	5,377	8	24.58	30.16	- .06	26.3 + 5.5	55	40	5	- 2	15	12	49	13	60	0.02 + 0.0	1	3,964	sw.	48	w.	27	16	15	0	2.9	32.1	1890	10.5	1886
Kearney	2,173	8	27.69	30.10	- .07	24.6 + 5.2	56	36	36	- 4	26	14	35	14	69	0.16 + 0.0	5	10,447	nw.	54	n.	11	9	12	10	5.7	32.1	1890	1.1	1888
North Platte	2,841	19	27.05	30.15	- .07	27.1 + 9.5	60	26	50	- 2	19	26	50	27	77	0.03 + 0.0	4	7,724	nw.	40	nw.	11	6	19	6	5.1	32.1	1890	7.7	1875
<i>Middle Slope.</i>																														
Colorado Springs	6,098	23																												

### Chart I. Tracks of a

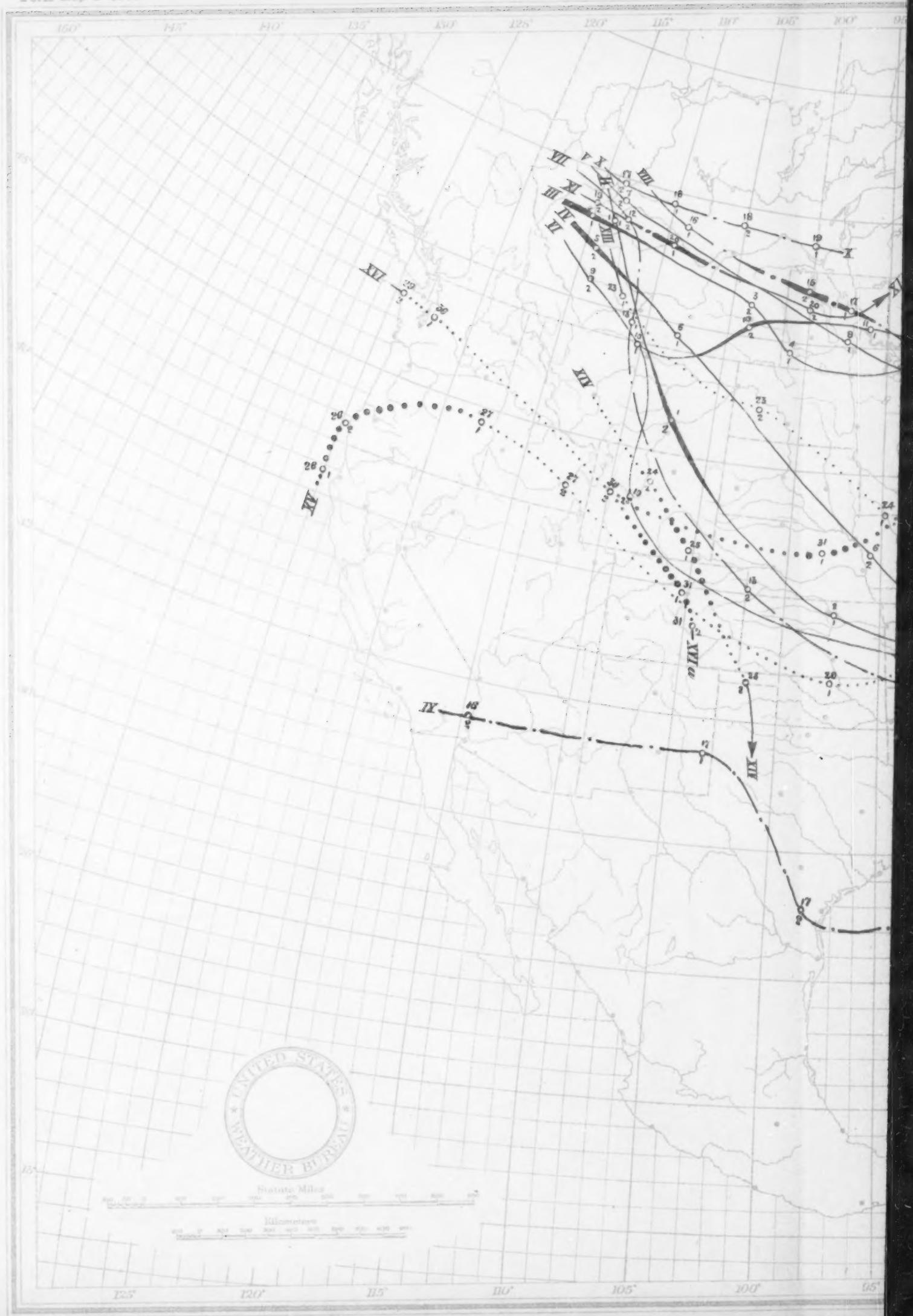
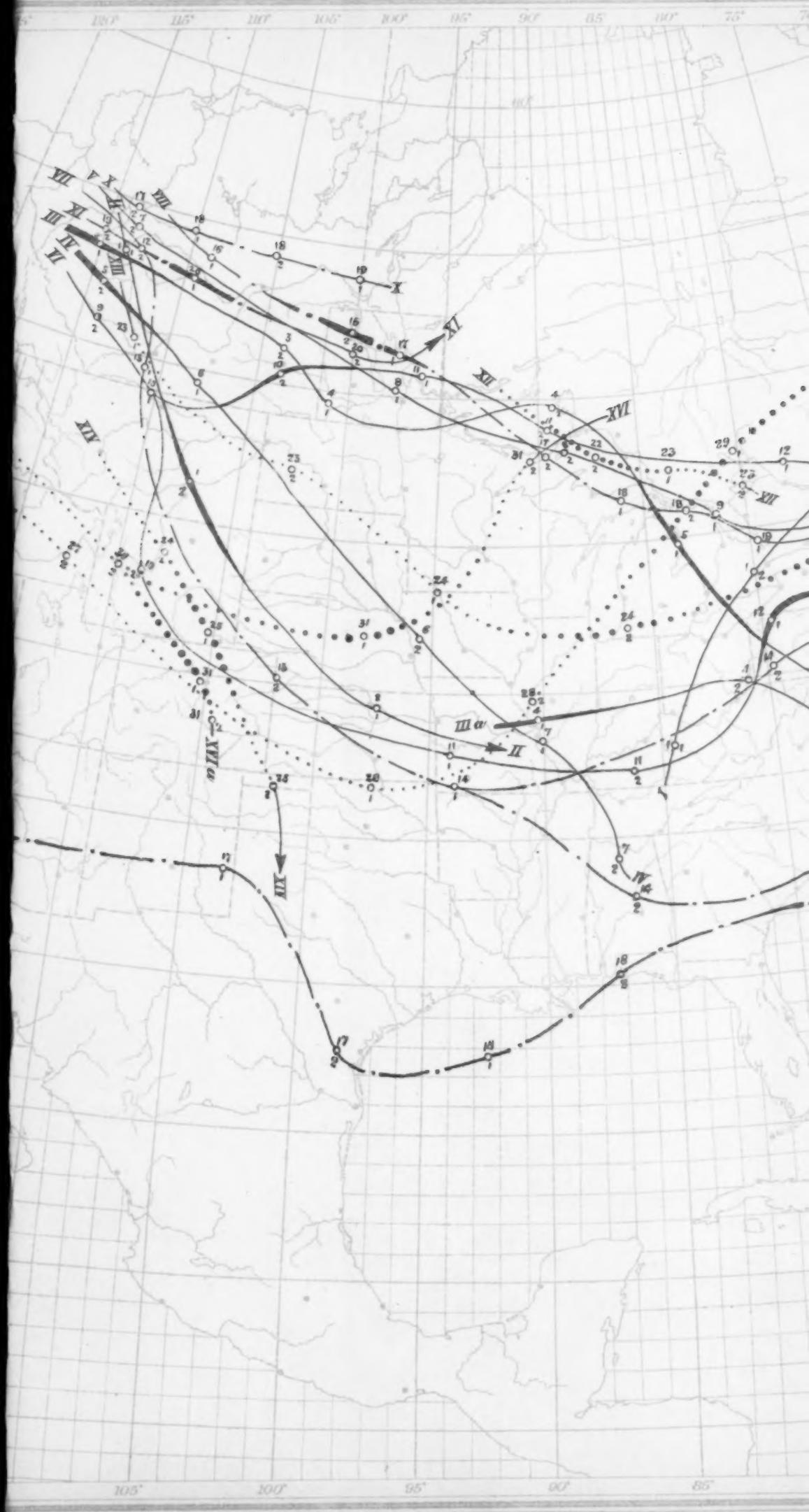


Chart I. Tracks of areas of Low Pressure. January, 18



January, 1893.



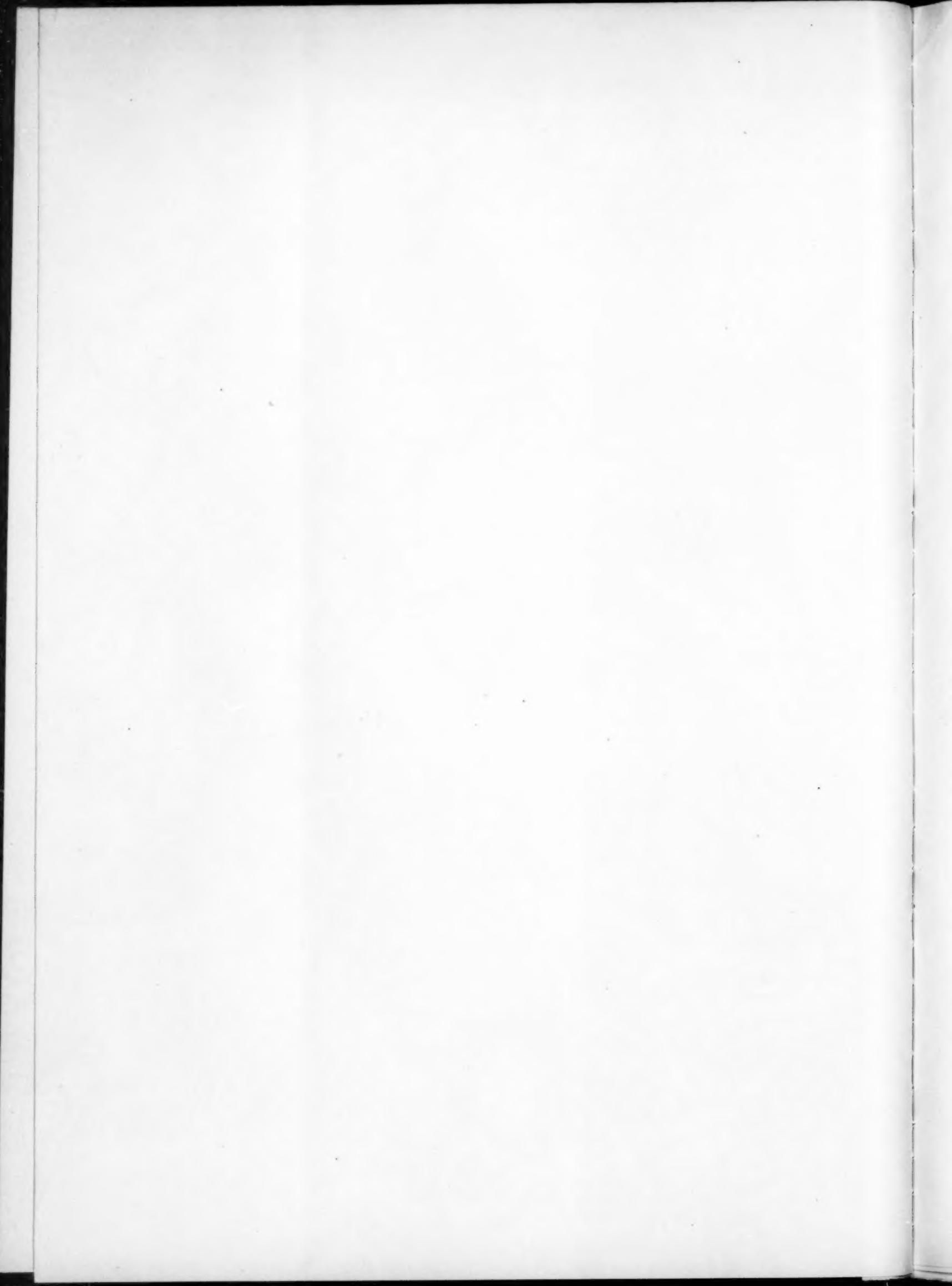


Chart II. Isobars, Isotherms, and Winds. January, 1893.

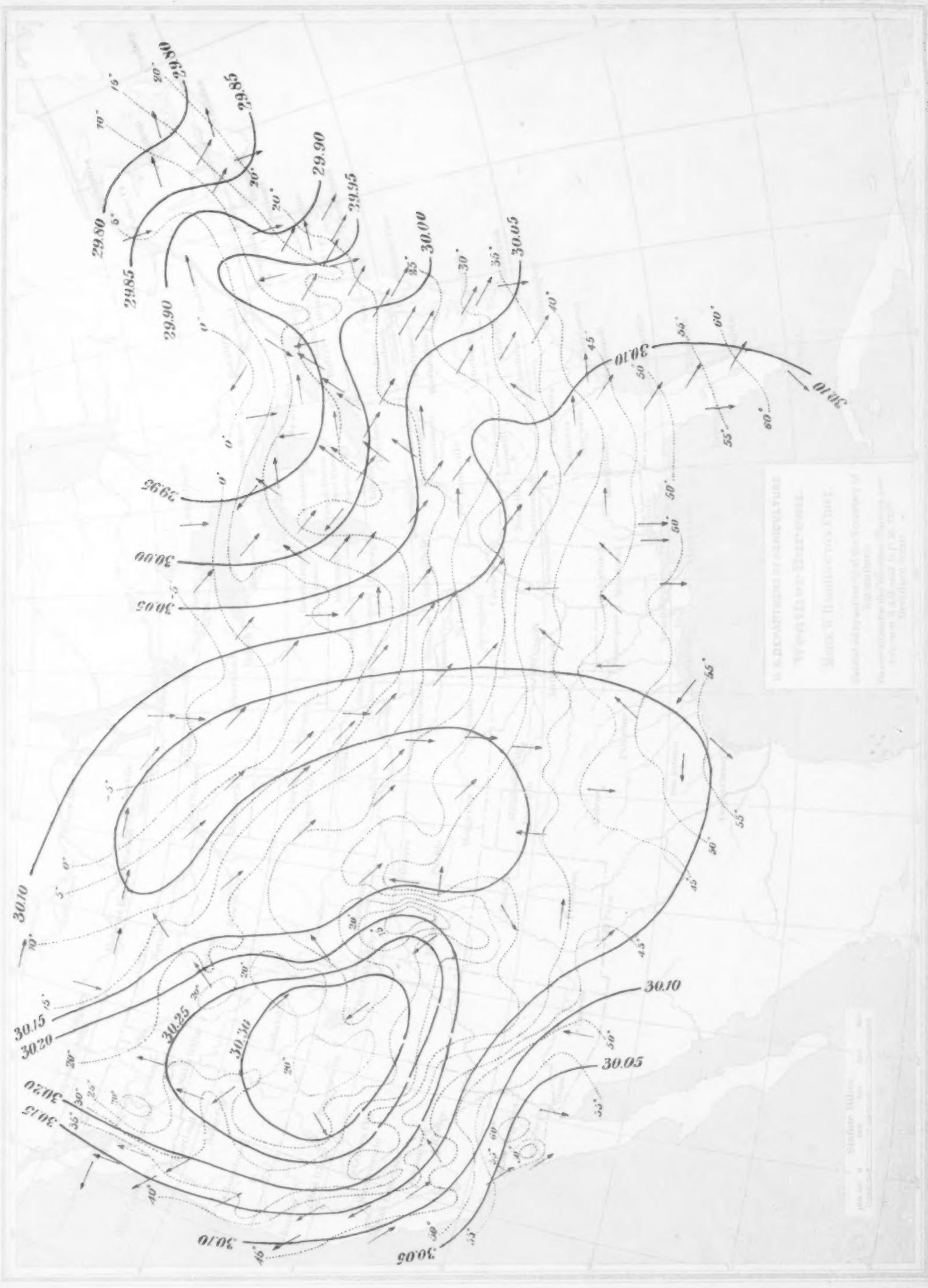


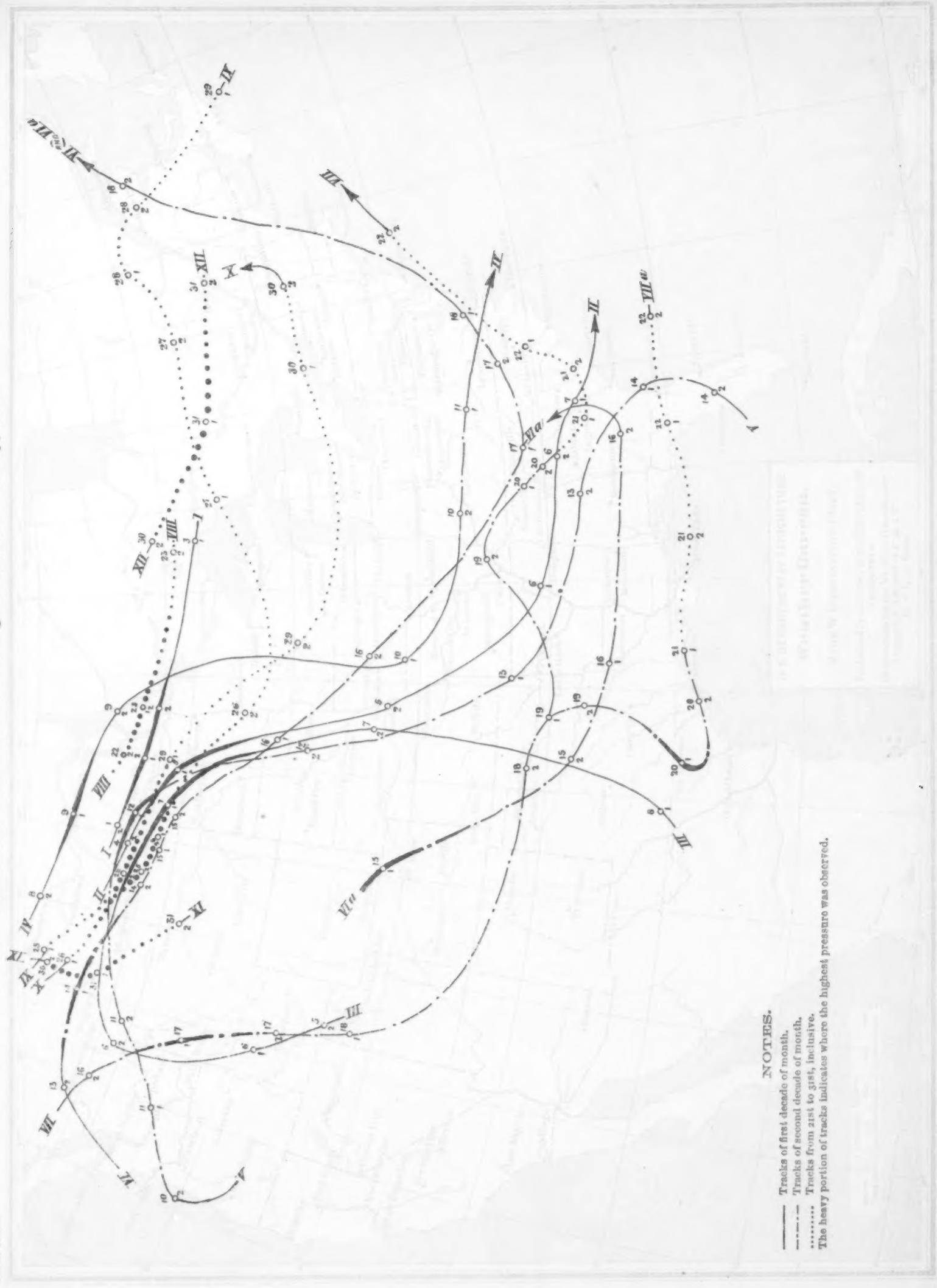


Chart III. Precipitation. January, 1893.





Chart IV. Tracks of areas of High Pressure. January, 1893.



## NOTES.

— Tracks of first decade of month.

— Tracks of second decade of month.

• Tracks from 21st to 31st, inclusive.

The heavy portion of tracks indicates where the highest pressure was observed.

See Diagrams of Weather Conditions

Chubick's Meteorological Diagrams.

See Diagrams of Weather Conditions



Chart V. Depth of Snowfall (inches) and Limits of Freezing Weather, January, 1893.





Chart VI. Depth of Snow (inches) reported on ground January 15, 1893.



Map of the United States  
from the U.S. Geological Survey  
1:10,000,000 scale



Chart VII. Depth of Snow (inches) reported on ground January 31, 1893.



1. Approximate elevation in feet  
2. Approximate elevation in meters  
3. Date of observation  
4. Position of observer



Chart VIII. Normal Pressure (20 years) and Average Wind Direction (15 years) for January.

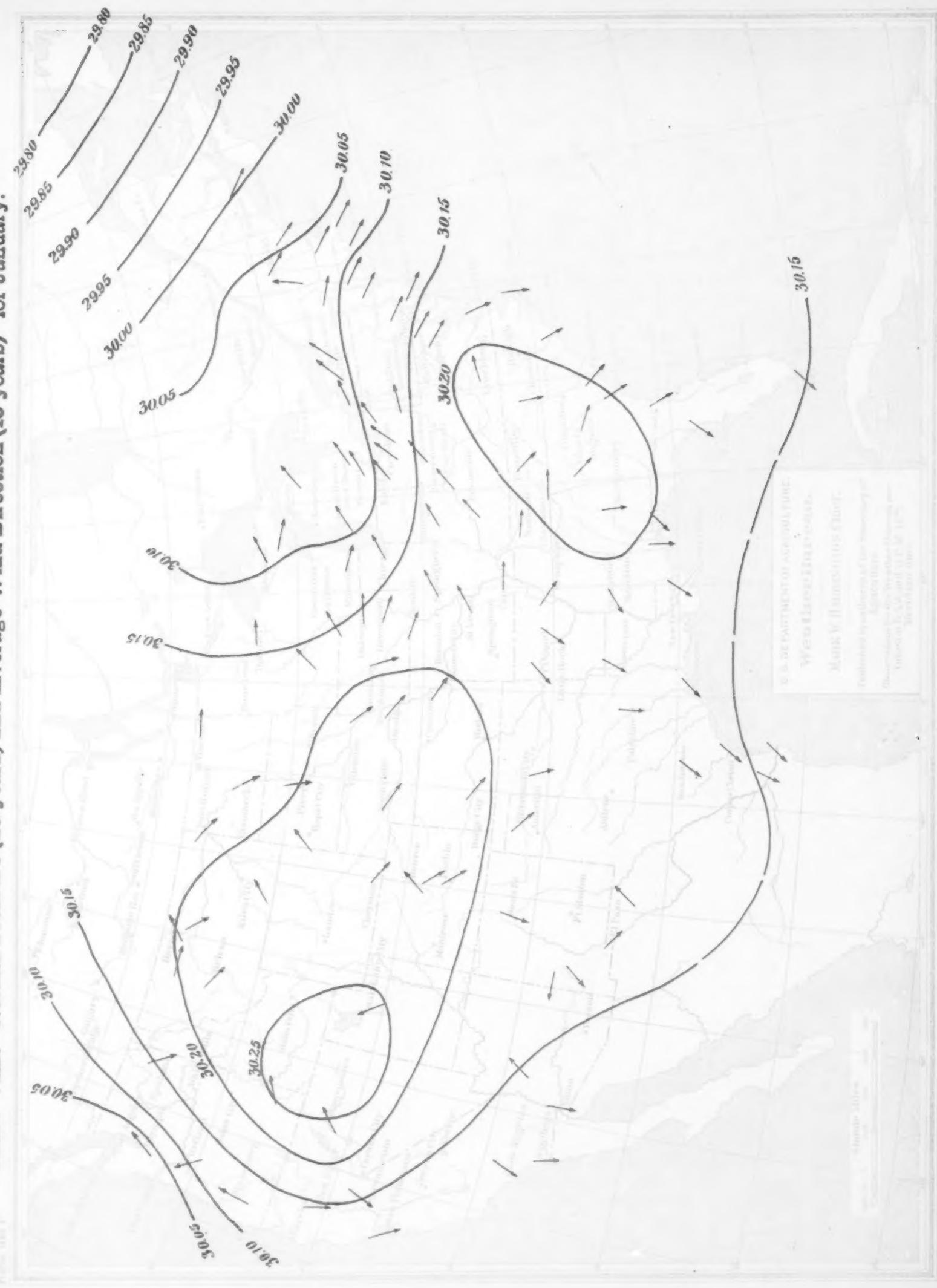
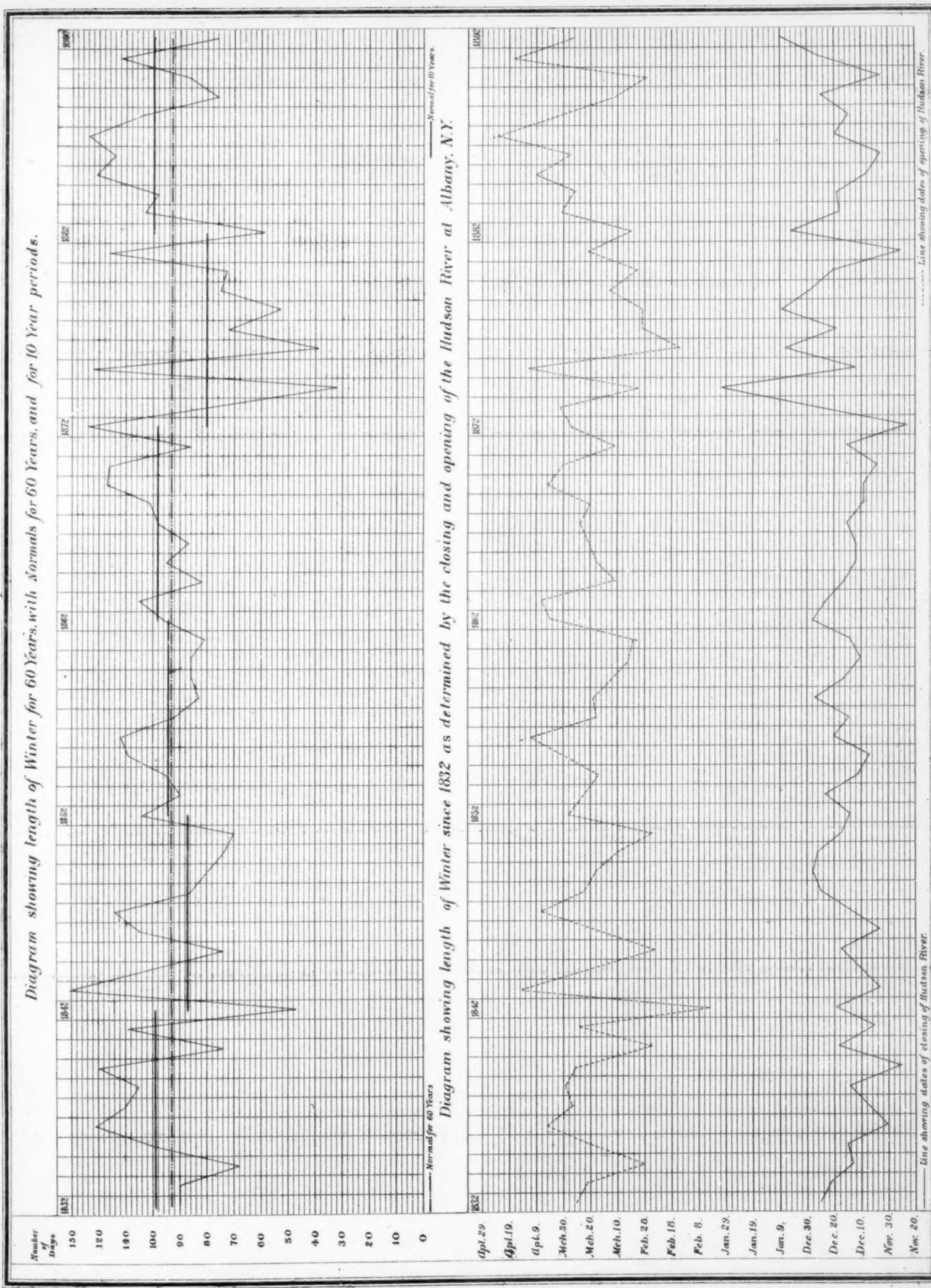


Chart IX. Average Length of Winter and Dates of Closing and Opening of Navigation at Albany N.Y. 1832 to 1892

Chart IX. Average Length of Winter, and Dates of Closing and Opening of Navigation at Albany, N. Y., 1832 to 1892.



Mr. A. F. Sims,  
Observer, Weather Bureau,  
Albany, N.Y.